DOMESTIC ENGINEERING

Whole No. 981. Vol. LVI. No. 14. 443 South Dearborn St., Chicago. September 30, 1911

WATER-WASTE.

Waste is loss. We have been and still are in most things a wasteful people. The American girl in Paris, telling a French acquaintance of some extravagant house-party at Newport, said: "You have doubtless observed that we Americans seek pleasure regardless of expense." "No, dear," was the reply, "but I have noticed that you court expense regardless of pleasure."

Our future business-profits will come more largely from conservation than expansion. We are reaching the limit of our national physical and commercial resources as a result of our wasteful methods of doing business. We are now glad to get coal that our forefathers threw on the dump. We stripped our forests with avaricious haste and woke to find that by so doing we had endangered our rivers, reduced their navigability and put an end to their fish-harvesting.

Good business awaits the plumbers and steamfitters of the United States, who will preach water-conservation. The water-meter wants more attention. **No gas-meters were ever known to save the consumption of gas, but the records of water-meters as water-savers are unimpeachable.**

The difficulty in the way of the universal use of water-meters is the ignorance and prejudice of the general consumer. He argues "Air is a necessity of life and is free, therefore water should be free also." Of course, he knows he pays for it indirectly in rent and other ways, but as it is not a direct tax, he is content to curse it in his annual condemnation of all taxes. He might have followed the argument further and said, "Food is a necessity of life; it should be free also."

The flat-rate system is as fatal in its effects as was the flat-rate for gas in Indiana and Kansas, in the early history of natural gas development. People were allowed to burn all the gas they wanted for a dollar a month, and then—the gas went out. The flat water-rate is a perpetual underminer of municipal economy. It encourages wilful waste, taxes continually the capacity of the water-works and diverts public moneys into unnecessary channels of expansion.

The water-meter insures maximum efficiency of all parts of the water-system, from the public reservoir to the private faucet. Let the consumer know through the dial of his meter that a 1-32-in. leak will charge him up with the cost of 250 gals. and the plumber will be kept additionally busy in the keeping of house-systems in good condition.

Wasted water has no flushing action on the sewers and very little purifying influence, if any. The minimum meter-rate provides for an abundance of water for ordinary household use and stops wanton waste. **Conserved water means more rapid extension of ample water-supply to outlying districts and this means plumbing and heating, too.**

If your city or town does not possess a meter-system, talk water-meter. It is a promoter of business-stability.

NEEDED—A PARCELS-POST.

Increase of business facilities throughout our country is powerfully contributive to continuation of prosperity. It is our individual duty to plug for the best things, to think about them, to talk about them, to stand behind the men who are endeavoring to bring them into being.

This country needs a parcels-post. It is therefore going to get it. How soon, depends on us. The Hon. Jonathan Bourne, jr., of Oregon, on June 23, 1911, presented the following bill to the senate:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act no higher postage rate shall be charged for the transmission of mail entirely within the United States or its possessions than is charged for transmission of mail partly within and partly without the United States or its possessions. The Postmaster General is hereby authorized and required to establish and enforce rules and regulations which will give the people of the United States rights and privileges in the use of the United States mails as liberal as the rights and privileges the United States accords to the people of the most-favored nation.

It is certainly humiliating that we should be forced to consider the passage of laws which give to American citizens privileges between themselves equal to those enjoyed by residents of this country, who transact business with residents of foreign countries. Study for a moment the following facts and you will readily see where we are losing out.

In the United States, the rate of postage on fourth-class matter is 16 cents a pound, with a limit of four pounds.

Twenty-nine foreign countries may, by treaty, and do constantly ship fourth-class matter through the United States mails at 12 cents a pound with a limit of 11 pounds.

This is reciprocity with a fuzz on it. You can send a Christmas present, weighing 11 pounds, from San Francisco to Rome, Italy, for 12 cents a pound, or $1.32, but if you want to play Santa Claus to some one in New York, you must divide the gift into 4-pound packages and pay 16 cents a pound for their transmission, or $1.76.

A Jap in New York can send an 11-pound package to his honorable parents in Tokyo at the 12-cent rate, but the New Yorker is limited to a 4-pound package to his best girl in Washington, and must pay 4 cents more per pound than the Oriental.

The Bourne bill is worth supporting. It is a conservative and immediate step to an equalization of transmissive facilities and rates, and, if passed, will pave the way for a parcels-post legislation which will give the home-folks the advantages at present enjoyed by so many other countries.

VAGARIES IN BUBBLE-FOUNTAINS.

A year or so ago the State Board of Health of Massachusetts, following the lead of a western state or two, declared against the common drinking-cup for use in public places, says the "Boston Evening Transcript," and it is interesting at this distance, when the commercial spirit for evasion of the regulation has had chance to exercise its ingenuity, to note some of the developments. In general it may be said that the common drinking cup has gone. At the committee hearings in the State House during the past session the old familiar tray with pitcher and glass has been used and on some of the harbor steamers there hangs the tin drinking-cup with its chain, but in general it is but fair to say the cup has been abandoned. The railways have cut the corollary Gordian knot by neglecting to supply any substitute whatever for the cup, leaving it to the forethought or the ingenuity of the traveler to supply the deficiency. The forethought has usually been the provision of an individual or at least a family cup, which in its inexpensive paraffine form ought to be more commonly on sale on trains, while the ingenuity has manifested itself oftentimes by the seeker after the cooling draught enveloping the faucet with his mouth, a practice less to be desired than the cup. This process, while not so objectionable as that said to be the custom of the brakemen, the drinking from the cover of the tank, is one not to be tolerated in a civilized community, for while the old common drinking cup was a danger to him who used it, the placing of the lips about the spigot may be a danger even to him who has provided in a reasonable way against contamination, but who is left unprotected at the vital point of contact.

As a result of the agitation against the common cup a variety of patterns has been developed of bubbling fountains. In its principle this form is most admirable, for in its perfection the lips touch only a flowing stream of water, and any infection that the mouth might convey is carried away in the waste flow; the mouth itself touches no metal. There is safety in the ever-flowing bubbling fountain. But two principles here come into play—the desire of the rival maker to gain trade by economical construction or substitution of less costly devices, and the desire of the purchaser to expend as little as possible. The result of the two wishes has been a variety of forms, some clearly evasions of the fundamental principle, seeking to avoid the cost of continuous water, and others adding to this economy the use of old or inexpensive fixtures. The ingenious management of a railway company running through one of the wealthiest suburbs of Boston has satisfied itself that the use of the old faucets will clear the regulations, provided they are soldered on to the pipe upside down. The flow of water is up, a stream is possible, and not a cent has been paid out save for a few minutes' worth of labor. But this is the most inviting arrangement possible to suggest the direct application of the lips to the mouth of the faucet. In this the fundamental principle of cleanliness is violated. Another form of intermittent fountain which uses water only while a spring valve is held has a flat head. This has admirable principles so long as the stream is constant, for then the metal part is untouched by lips and is continually washed by fresh water, but it is subject to misuse when the water supply is under control, for then some thirsty ones apply the lips to the metal, press the faucet handle, drink their draught and cut off the supply even before the lips have left the metal. In the newest of the Chicago railway terminals the drinker finds before him a sort of cup into which the water wells up in the center when the valve is pressed. To this cup many of the thirsty ones press their lips, drinking from its edge and not from the bubble, just as they formerly did from the old tin dipper. It is somewhat an improvement over the dipper, but it fails to represent that careful thought and adaptation to its purpose that every other portion of the great structure demanded. On the other hand, it is interesting to see what can be done by those who recognize the principles at stake in replacing the common cup by some hygienic substitute. In the little town of Brandon, Vt., public-spirited citizens have placed a drinking-fountain in the central square. The water is cooled by ice so as to be refreshing in the heated season, and about the jet there is a rim, the controlling device for the flowing of the water, which acts as a face-guard and is truly a barrier against him who is thoughtless. There is certainly in this bubble-fountain group of water-dispensers room for further action for the authorities toward the achievement of the original purpose of the regulations, the avoiding of contact between the lips of the drinker and the material of any appliance to be touched with the lips, whether of cup or of fountain.

EXACTLY.

"The middleman ought to be eliminated if we want to lower the price of necessities."

"In other words, if we eliminate the middleman it will be easier to provide for the inner man."—Houston Post.

ASKING TOO MUCH.

An old negro preacher did the honors, and the candidate for baptism was a coal-black negro woman. The preacher led his victim far out in the stream where she could be thoroughly immersed, and at the auspicious moment he cried in a loud voice:

"Be stiddy, sistah, be stiddy, an' you'll come up whitah than snow."

"Oh, parson," she exclaimed, "dat's askin' too much; a cream color'll do!"—National Monthly.

Selections from Examination Papers Set in Plumbers' Work at Dundee Technical College, April, 1911*

With Model Answers by John Foggie, F. C. S.

Question 1. Make any alterations you consider necessary on the given sketch of a simple hot-water circulation, Fig. 1, giving reasons for each.

Answer.—(1) It will be seen that, as it stands, when cistern J is filled water will continue to flow from the end of the expansion-pipe H, so that H must have its open end not less than 2 ft. above the level in J, after the alteration required in (2).

(2) With cistern J as shown, water would not rise to supply T for sink; therefore the cistern must be raised a few feet above it.

(3) The boiler flow A to D is wrong. It must be taken to C, and the return B coupled at D; because then the water will flow according to the natural law of convected currents, i. e., the warmed and lighter water in the boiler will be raised by the colder and denser water flowing from the cylinder at D, and thus a natural circulation be established.

(4) The cold supply from J must be coupled into the bottom of the cylinder, say at G; because if cold water were thrown into the cylinder at E, the contents would be quickly cooled, thus rendering the system extremely wasteful of heat.

(5) The supply to sink must be taken off either at the top of the cylinder or somewhere on H near it: because with the given arrangement only half the cylinderful of hot water could be drawn off, cold water direct from the cistern following.

Question 2.—A water-pipe has to be laid diagonally across a rectangular field, 180 yds. long and 120 yds. broad. What will be the length of the pipe? On a separate sheet of paper, using your rule only, draw as accurately as possible angles of 90 deg., 45 deg., 60 deg., 30 deg., 120 deg., and 135 deg.

Answer.—The first part of this question is a problem in which it is required to find the length of the hypotenuse of a right-angled triangle, the containing sides being given (see Fig. 11).

The principle involved in this problem is contained in Euclid 1, 47. The square on the hypotenuse is equal to the sum of the squares on the containing sides. Consequently $180^2 + 120^2 = CB^2$. $32400 + 14400 = 46800$, which is CB^2. To obtain CB extract the square root of $46800 = 216.33$ yds., which is the length of pipe required. This problem can also be solved by construction.

The second part of the question may be answered as follows:—Take first the right angle of 90 deg. This can be constructed by taking advantage of a geometrical fact with which every tradesman should be familiar. If in any triangle the sides be in the proportion of 3, 4 and 5, the angle contained by 3 and 4 is a right angle.

This may be applied, for example, in squaring the end of a sheet of lead. Thus: Let AB in Fig. 8 be the straight line representing the edge of the sheet. One would proceed as follows:—Make a mark C at the point where the sheet is to be cut, and from this towards A measure any multiple of 4, D, in any convenient number; say 9, as given in the figure = 36 inches, i.e., 4×9. Then take the same multiple of 3, i.e., 27 in., and with the rule held exactly at C, describe as accurately as possible a small arc E, as near as possible to where the perpendicular (or squaring line) will pass as judged by the eye. Next either cut or mark accurately off on a wooden lath $5 \times 9 = 45$ in. Apply one end at D and describe a small arc cutting E in F. Join CF and continue to G. If the measurements have been accurately made and applied, DCG will probably be more accurately a right angle than could be drawn with the shop square.

Fig. 9 shows how 45 deg. may be obtained. First erect a perpendicular by the foregoing method and then mark off E and F, equi-distant from C. Measure EF and halve it at H, and join CH, producing to G.

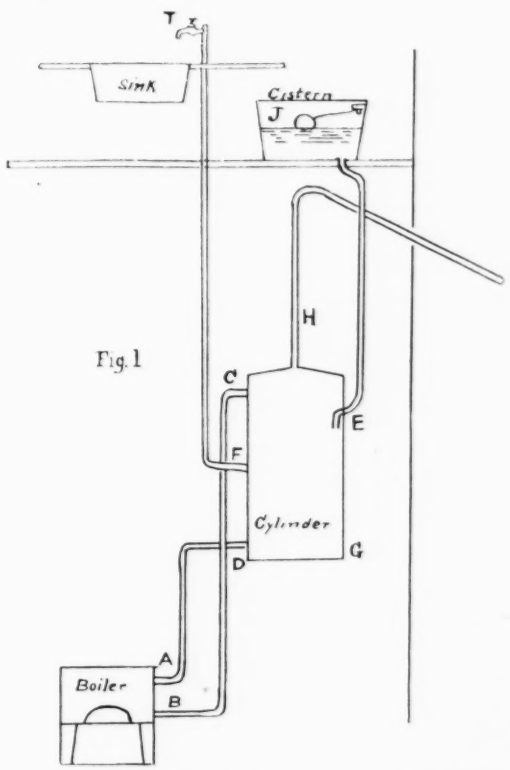


Fig. 1

As we have halved the 90 deg. angle, ACD, ACG, GCD are each angles of 45 deg. Then for the angle of 135 deg. we have BCD = 90 deg., and DCG 45 deg. These added together give 135 deg.

To obtain the angle of 60 deg. construct a triangle, whose sides are exactly equal in length, by using a foot-rule, and starting with a given base AB, Fig. 10. A triangle whose sides are equal gives all three angles equal, and as the three interior angles of any triangle are together equal to two right angles or 180 deg., then each of these will contain 60 deg.

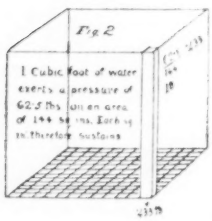
To obtain 30 deg., erect from B, BD (Method I.) at right angles to AB. Then ABD = 90 deg. Subtract from that ABC which is 60 deg., and 30 deg. is left—i.e., DBC. For 120 deg. produce AB to E; EBD = 90 deg. and DCB = 30 deg. It is evident these two added together will be EBC—an angle of 120 deg.

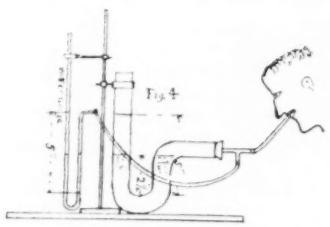
Question 3—Water has to be raised from a well 40 ft. from the water to the ground level, and lifted 30 ft. above.

*Reproduced by courtesy of "The Plumber and Decorator," London, England.

Sketch diagrammatically how this could be done. If a 2½-in. pump be used, what is the pull on the pump-rod when raising water?

Answer.—Fig. 3 illustrates how this might be arranged. A suction and lift (sometimes called a lift and force) pump is required, and this must be placed not more than 28 ft. above the level of the water. Theoretically, a barometric pressure of 30 in. mercury can support a column





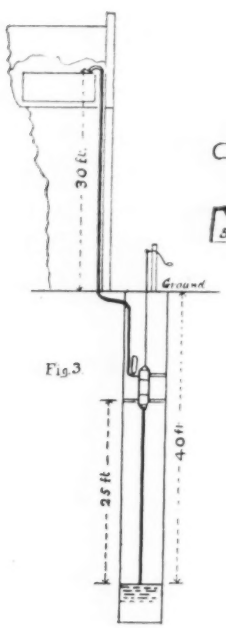


Fig. 3.

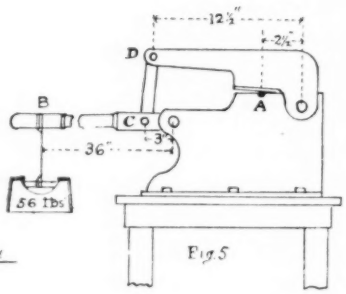


Fig. 5

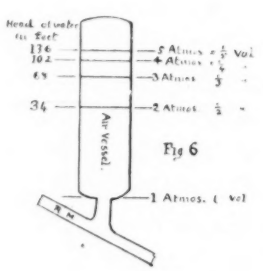


Fig. 6

of water 34 ft. high, but an ordinary pump cannot produce the perfect vacuum necessary for a rise of this height. From 25 ft. to 28 ft. is considered a reasonably practical height above the water.

Such a pump would require an air-vessel on the delivery-pipe, as shown in sketch. In calculating the pull on the pump-rod, the total vertical height is taken, i.e., 70 ft., as the problem practically resolves itself into raising a column of water of that height and of the sectional area of the piston or $2.5^2 \times .7854 = 4.9$ sq. in.

$\therefore 70 \times 4.9 \times .433 = 148.5$ lb. Answer.

In such a case as this it would be much better practice to put down two pumps and connect their rods to suitable gearing with cranks at 180 deg.

Question 4.—A rectangular tank, 2 ft. x 2 ft. x 4 ft. high, is fixed 40 ft. below the supply cistern, and is connected to it with an inch pipe. What is the pressure in lb. per square inch on the bottom of the tank? How may the constant you use be obtained from first principles?

Answer.—On the assumption that the bottom of the tank is 40 ft. below the level of the water in the cistern, we have $40 \times .433 = 17.32$ lb. per square inch, or, on the whole area of the bottom, $17.32 \times 576 = 9976.3$ lb.

Fig. 2 may explain how the constant .433 is obtained. It will be seen that this number represents the pressure in lbs. exerted by a column of water one square inch in section and one foot high.

Question 5.—The sketch, Fig. 5, shows a plumber's bench shears. Find the shearing force at the point A when a 56-lb. weight is suspended as shown at B.

Answer.—This is a combination of two simple levers of the second class, i.e., where the fulcrum is at one end, the power at the other, and the resistance to be overcome somewhere between.

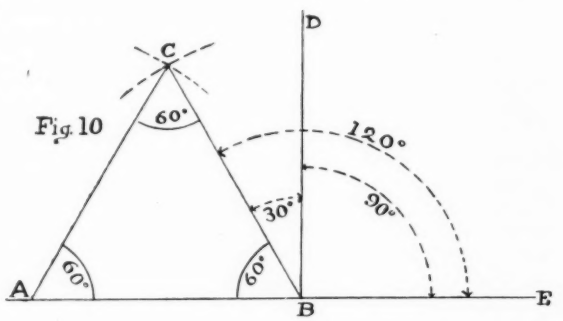
Using the simplest solution, $P \times \text{arm} = W \times \text{arm}$, we have with the lower lever the pull at $C = \frac{56 \times 36}{3} = 672$ lb., and this is the force pulling downwards at D. To find shearing force at A we have $\frac{672 \times 12\frac{1}{2}}{2\frac{1}{2}} = 3360$ lb., which is the answer.

Question 6.—Neglecting absorption of air, at what height will the water stand in a cylindrical air-vessel 20 in. high on a suction and lift pump, when water is being thrown to a height of 136 ft. above it? Of what use is the air-vessel?

Answer.—Boyle's law states that the volume of a gas varies inversely as the pressure. That is to say, if we take unit volume of a gas in a confined space at, say, a pressure of one atmosphere and proceed to put another atmosphere of pressure on it, the volume will be halved; if another atmosphere be added the volume will be reduced to one-third of the original.

Here we start with a volume 20 (the vessel being cylindrical, each inch in height will be a definite aliquot part of the volume), at an initial pressure of one atmosphere (Fig. 6).

Now a head of 34 ft. of water corresponds pretty nearly to one atmosphere, and therefore a column of water 136 ft. high corresponds to a pressure of $\frac{134}{34} = 4$ atmospheres additional, or 5 atmospheres total pressure on the air contents of the vessel. Consequently the air will



now occupy only 1-5th the original volume, or a space of 4 in. at the top of the vessel.

The use of an air-vessel is at least two-fold. First, the air imprisoned serves to act as a buffer or spring, lessening in great measure the hammer action on the valves and their faces; and, second, it has the effect of causing the water to flow in a steady stream from the end of the pipe, instead of a series of spurts simultaneously with every stroke of the piston.

Question 7.—A suction-pump is placed over a hot well

17 ft. above the water, which is at a temperature of 90 deg. C. Indicate what happens when the pump is primed and worked. Sketch a class experiment you have seen bearing on this point.

Answer.—Water tends to pass into vapor at all temperatures, and this vapor exerts a definite pressure, or tension as it is termed, for each particular temperature, increasing therewith.

If, then, the atmospheric or other superincumbent pressure on the water be reduced below the pressure or tension of the aqueous vapor for any particular temperature, the water boils or enters into ebullition, giving off steam readily.

For example, the tension of water vapor at the freezing point of water is 4.6 millimetres, or .181 inch of mercury. If, therefore, we reduce the pressure on the surface of the water in a suitable vessel, by means of a very good air-pump, down to .181 inch or less, the water will boil at the freezing-point. It will be evident, therefore, that that boiling-point of water is dependent on the pressure to which it is subjected, and this is the reason for taking the atmospheric pressure into account when fixing the

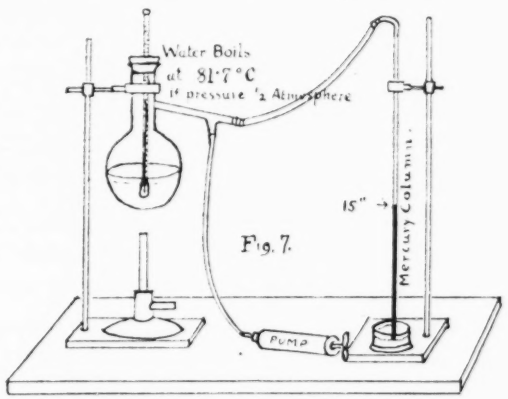


Fig. 7.

boiling-point of water on a thermometer. Indeed, the boiling-point of water is stated to be "that temperature at which the pressure of its vapor is equal to the superincumbent pressure of the atmosphere."

Now as the atmospheric pressure is not constant, but varies from time to time, so would also the boiling-point vary unless a definite pressure was agreed on. The boiling-point of water is therefore fixed, and is that temperature at which the vapor pressure of water is equal to a column of mercury 760 millimetres or 29.92 inches high (this being taken as the average pressure of the atmosphere at sea level), and this temperature is called 100 deg. Centigrade or 212 deg. Fahrenheit.

Now the tension of water vapor at 82 deg. C. or 179.6 F. is half an atmosphere. This means that if a quantity of water be taken in a vessel such as represented in Fig. 7, heated to 82 deg. C. and the pressure reduced by means of a pump to half an atmosphere, the water will boil rapidly, and although the pump be kept working the pressure will not be further reduced, as shown by the mercury column remaining steady at 15 in.

Applying this principle to the case in question, it is evident if we raise the water 17 ft. up the pipe we remove from its upper surface half the pressure of the atmosphere. Under these conditions—the elevated temperature and the reduced pressure—the upper surface will boil rapidly, filling the partial vacuum below the piston with steam.

At 90 deg. C. the formation of steam would take place with greater ease, and as a matter of fact the water at this temperature would not rise more than 10½ ft. up the suction-pipe.

In order to cope with such a difficulty the pump must be lowered further into the well or nearer the water, or until the reduction of pressure will not fall below the tension of the water vapor for the given temperature.

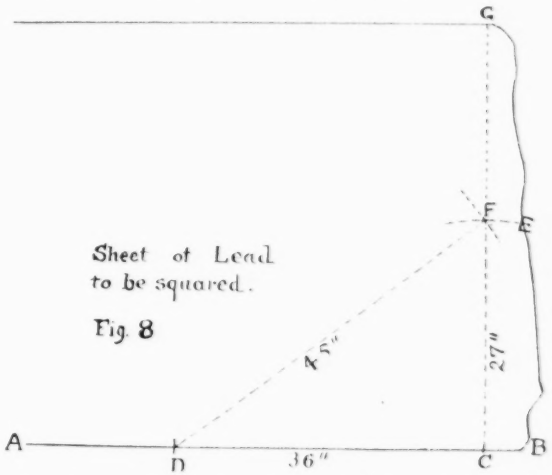


Fig. 8

Question 8.—A 6-in. iron drain, 40 ft. long, is intermittently flushed from a laundry with hot water, raising the temperature from 15 deg. to 51 deg. C. Calculate the air-expansion in length of drain due to this heating effect.

Answer.—This question involves a knowledge of Charles' law of the effect of heat on gases. This law states that the volume of a gas is directly proportional to the temperature if that be measured on the absolute scale.

The above temperatures are converted into degrees absolute by adding 273 to each, and they therefore become 288 deg. abs. and 324 abs. So we have 40 volumes of air at 288 deg., and proceed to find what volume they will occupy at 324 deg.

$$\frac{324 \times 40}{228} = 45 \text{ volumes,}$$

or an increase in the length of 5 ft., i.e., 5 ft. of air would

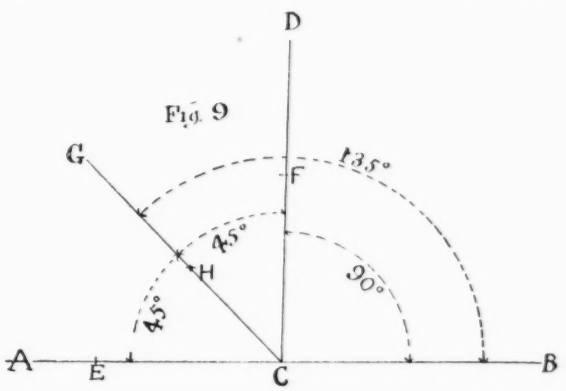


Fig. 9

be driven out at each heating. As the pipe cooled down a corresponding contraction and inrush of air would take place.

Question 9.—How may a trap become unsealed? Given an unventilated 2-in. P-tray with 2½-in. seal or drown, what pressure is necessary to force air through it from the drain-side? Would a 6-in. trap with the same seal differ in this respect?

Answer.—A trap may become unsealed in a number of ways—(a) distortion, (b) momentum, (c) waving out, (d) evaporation, (e) siphonage, (f) lodgment of foreign bodies such as cotton-waste, cloth, etc., causing gradual siphonage of the contents.

The pressure necessary to force a trap is equal to the head of water obtained when the contents are blown from the drain-side so as to stand up in the vertical in-go of

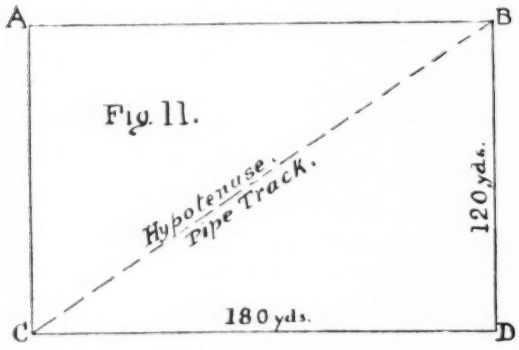


Fig. 11.

the fitting, and is equal to double the height of the seal, provided that bend and vertical part are of the same diameter and sectional area.

Thus, in Fig. 4, it is easy to see that if the part above the seal-level in the long limb were of a conical or other enlarged form, the water would not rise so high, and thus the head of pressure would be less to overcome.

The experiment in Fig. 4 also illustrates the fact that a 6-in. trap, or in fact any size of trap having the same depth of seal (and satisfying the same conditions), requires the same amount of pressure to force it. The outgo of the trap is plugged with a rubber stopper, through which passes a T-piece, one end of which is connected to a water-gage made of ⅜-in. glass tubing.

On blowing gently it will be seen that the air just escapes through the seal of the trap when the water-gage stands at 5 in., or double the height of the seal in the trap. A 6-in. trap with the same seal would therefore require the same pressure.

NOTES FROM NEW ORLEANS.

The Borum & Whiting Co. has been dissolved, and W. G. Borum will continue the business under the firm name of Borum & Whiting. Mr. Borum reports good business for this time of the year. He has recently secured plumbing and heating contracts for the Mergenthaler building, one of the finest structures in the South, and among other contracts may be noted the heating and plumbing for the new school at Rayne, La., and the Bank of Ascension at Donaldsville, La.

The Leovy Plumbing Co. has secured a contract for the installation of the plumbing in the famous Young Men's Gymnastic Club, one of the finest installations of its kind in the country. The contract-price approximates $5,000.

Lambert Bros. report enough work to keep them busy until the first of the year.

Thos. W. Goreau has many large contracts on hand, the principal of which is the Boston Club. Business is brisk in the jobbing-line, and future prospects are very bright, due in a great measure to the forcing of sanitary connections.

J. M. Cassidy also reports business extremely good. Throughout the year it has been quite satisfactory.

Edw. Scheckeler & Co. have all the business they can attend to. They have just completed the installation of the heating and plumbing in the new People's Library.

Grimaldo & Egloff have a number of new contracts on hand which insure good business until the end of the season.

Jas. Petrie & Co. have had a good season, keeping a full force of men employed all the time.

The Gaienne Co. is working its force at full time. Important contracts have just been closed for the Ursuline Convent, amounting to $25,000 for plumbing alone. The company has also branched out into the heating business, Geo. B. Hiett being associated with the concern in this particular branch of the company's business.

J. V. Stiefvater reports business to be very good, and has been quite successful in securing contracts in new territory.

Paul Mueller has all the business he can possibly attend to at the present time. So busy has he been that we are informed that night work has been necessary.

E. M. Babst & Co. informed our correspondent that the plumbing business is reaching a new high-water mark. The firm is taking advantage of the building activity and a number of new contracts is the result.

V. J. Gondolf has opened a new place of business at 703 Carondelet St. He had a good acquaintance with the trade, and the new venture is accompanied by best wishes for his success.

The O'Brien Plumbing Co. is doing a nice steady business. Several excellent installations have recently been made by this firm.

Jno. M. Huber has no complaint to offer. Work is constant and several profitable installations have been made lately.

Thos. McKendrick's Sons have been busy all the year. They possess an unlimited fund of energetic optimism, and those who know them have christened them the "happy family."

Lindauer & Kussman have been so busy that they have been unable to secure enough plumbers to carry on the work at times. Although this is inconvenient occasionally, it shows that business is good.

H. Boettner & Son have secured a strangle-hold on several good contracts which will keep them busy for some time to come, and will help out the records of a prosperous year of business.

Jas. H. Aitkin & Sons have secured a number of new contracts, among which may be mentioned: Connecting of Royal street side of Cosmopolitan Hotel with the new sewer and water systems. There are 90 fixtures in this job, including 21 new bath-rooms. The remodeling of bath-rooms in residence of H. DeLacey Vincent: a bath-room in the Richardson residence on St. Charles avenue; plumbing and hot-water heating in Conway residence on Burdette street; hot-water heating in the Wilson residence, corner Burdette and Burthe streets, and contracts for about eight sewer jobs.

CONTRACTS AWARDED.

Springfield, Mass.—J. J. Cotter has been awarded the contract for the installation of a heating system in the new L'Union Canadienne hall on Center street.

Hastings, Minn.—D. T. Quealy & Co. have secured the contract for the installation of a steam-heating system in J. F. Geraghty's store at Rosemount.

Toledo, O.—Walker & Johnson have secured the contract for the plumbing of the new market house. The consideration is $2,122.

New Ulm, Minn.—Charles Emmerich has been awarded the contract for the installation of a steam-heating plant in the New Ulm Publishing Co.'s building.

Rice Lake, Wis.—Lovell & Polland have secured the contract for the installation of plumbing and heating systems in J. H. Hurd's residence.

Terre Haute, Ind.—The Prox & Burget Co. has secured the contract for plumbing and heating the college building and conservatory of music which the Sisters of Providence are building at St. Marys, Ind. The consideration is $35,000.

Indianapolis, Ind.—Hayes Bros, 437 Indiana Ave., are erecting a new two-story building at 26-28 West Vermont Ave., into which they will move their plumbing and heating establishment as soon as the building is completed. The new building is 150 ft. deep, and elegant office and show-rooms will be arranged in the front and up-to-date shop in the rear.

BUSINESS MANAGEMENT

NEW METHODS FOR OLD

"THE SQUIRE" APPROVES TEN PER-CENT PLAN.

Editor "Domestic Engineering":—The "Office Boy" is profuse in his reasons as to why the 10 Per-Cent Plan is not being successfully applied in the city of Minneapolis, but the writer, having a before and after knowledge of conditions, is just as positive that it is a good plan for both the jobber and the master plumber.

To begin with, we must recognize the fact that all rules have their exceptions. It is absolutely impossible to lay down a set of rules and follow them without deviation; and treating this as a proven fact, we have the jobber's reason for straying from the straight and narrow path when the occasion demands.

To begin with, we can say truthfully that it has made the master plumber a good collector; not a brow-beating bill-chaser, but a collector after a business-man's own heart, who looks at all sides of a contract or a job before he cuts a thread, ascertains from whence the money is coming and when, puts it down in black and white with his John Henry on the next line below, and is then ready for business. I well remember calling upon a certain house-owner a number of years ago for the purpose of trying to secure his contract. After some little talk, he began to rave about one of my competitors, and the gist of the matter was that he was sore because this particular master plumber had included in his proposal the fact that he expected 50 per cent of the contract price at the completion of the roughing-in and the balance upon the completion of the entire job. Mr. House-Owner, however, wished to pay "whatever he could" upon the completion, and the balance from "time to time," with a very indefinite period between times. I will confess that at the time I thought that the master plumber was drawing the line pretty close, but that incident started me to thinking and I arrived at the conclusion that inasmuch as my men expected their pay every week, and as the jobber likewise expected his money every month, there was absolutely no reason under the sun why I as a master plumber should not do likewise and, as it were, do a little collecting in advance, by having a definite understanding as to the price for the job and the amount and time of the payments, and I can truthfully say that this has done more to make my business a success than any other one thing.

There were, previous to the adoption of the Milwaukee Plan, scores of master plumbers in this city who were operating on the jobber's money; who knew as little as was possible about business affairs; who left their collections until pushed to it by the jobber because they disliked asking a man for money (why the devil should a man dislike asking for his own property?); and they were without a doubt mighty bad competitors.

Following the adoption of the Milwaukee Plan, some of the masters found for the first time that the local bankers had money to loan as well as to transfer from one checking-account to another, and some of them for the first time found their way to the cashier's desk and found that he was a pretty good fellow after all, in spite of the fact that he wore good clothes, a bored expression, and played golf to reduce his rotundity instead of toting 6-in. extra-heavy soil-fittings to the umpty-first floor of the Singer building.

Some of the masters found that it would be advisable to carry a little less stock in the shop, some found that it was not impossible to say "No" when called upon to do a job on the installment-plan, and a whole lot of them found that they would have to limit the amount of work they could handle. All of which has tended to improve the business for the man who is able to handle a generous volume of business on his own capital.

There will always be some small operators in the plumbing and heating field, just as there are in any other line of business, and there will always be times when they will hop in and pick out a few big jobs, but the fact remains that there will still be room at the top for the man who has the ability to elbow his way up there.

It is also a proven fact that the majority of the masters of this city favor the Milwaukee Plan over the old way. A proven fact, because we have eight jobbers in this city, two of whom operate on the old 2 per cent plan, and notwithstanding the fact that they are both concerns of fair size neither of them can be classed as a top-notcher in the jobbing field, in fact, I should say that they are finding it a hard matter to hold fourth and fifth places in the running.

The greatest evil which the Minneapolis masters have to contend with is the heating situation. The jobbers hold that it is right and proper for them to sell their heating materials to whoever cares to purchase them, and this is a proposition which should be eliminated without delay. To do away with it, the master plumbers and the master fitters must affiliate in one association for trade protection, and the jobber must treat plumbing and heating materials in the same light and accord them the protection to which they are entitled. The jobber's standpoint is just as foolish as it would be for the jobber of groceries to protect the retail grocer in the sale of coffee and then sell tea to one and all; or for the dry-goods jobber to protect the sale of calico and sell linen promiscuously.

In connection with the above, it would also be advisable to cripple the jobbers' use of the lien law by making it compulsory for him to deliver all materials to the master's shop instead of to the job. This would, of course, make it a little harder for the master and would increase his delivery cost, but it would place every master on the same footing; he would have to figure on doing his own hauling and its cost would be in proportion to the amount of business handled. Of course, it would be possible for the jobber to make a few precarious sales and rely upon the master to swear that the goods after being delivered to the shop had been taken to some particular job, but, at the same time, it would add a risk and an uncertainty to the sale that would compel the jobber to be sure in his own mind that the master was reliable before making the delivery.

In conclusion, I want to say, that if the jobbers will unite in sticking to the Milwaukee Plan, will deliver material to the shop only, and will place plumbing and heat-

ing materials on the same protected basis, we master plumbers and fitters will make more money and make it easier than ever before, and in return we Minneapolis masters should do all in our power to aid the local jobbers by purchasing just as much as is possible of our wares right here at home, instead of listening to those siren voices which are ever calling upon us for just a little order, just as an appreciation of this calling upon you to show you the only kind and quality of goods and which cannot be duplicated (except at any local jobber's at the same or even lower prices).

"The Squire."

ORIENTAL METHODS OF THE WEST.

Editor "Domestic Engineering":—Ye old craftsmen yet in existence and many of the widely-experienced mechanics, are astonished at the ever-increasing tendency to subdivide trades to make allowance for those capable of accomplishing only a minor part of a general trade. As it is now, there are six different unions, under separate classifications, in the trades of plumbing and pipe-fitting. In the near future, we may expect to hear of unions for thread-cutters, pipe-cutters, notch-cutters, vise-erectors, tong men, joint-wipers and calkers. The employers, in order to turn out these specialists accurately, besides securing horoscopes should secure on yearly contract for the master plumbers' association the services of a phrenologist to bandage up the heads of apprentices in order to develop one faculty (bump) suitable to the respective branches they are assigned to. A knowledge of theosophy should be added to apprenticeship, as a source of hope to the initiates of uneven domes, who, after 10 successive reincarnations, may become general mechanics through that process, in preference to old age ending apprenticeship that oslerizes one before a general knowledge of plumbing and pipe-fitting dare be applied. At the end of the tenth degree, the past-master of the craft should be required to carry all his working-cards attached to his tool-sack with a crier in advance announcing the wonder of the age, a general mechanic of the trade.

In all trades and professions, for the sake of so-called business-methods, it is the tendency to turn out a lot of freaks, and when some occurrence prevents the specialist being on duty, everything gets out of gear because of none present possessing that solely and specially developed bump of knowledge. I doubt sincerity of motives of founders and many endorsers of trade-schools, unless it is to ease their conscience for assisting to destroy a general mechanical or professional experience.

Specialization is as senseless as the caste-system of the Orient, being similar to it, and due to the various unions springing up to hinder opportunity for steadier employment as well as an industrial and mental development. This is the fruit of the tree of specialization, and the taste is bitter to employers, the public, and those of general ability. A cartoonist would find in this subject a wide range to shoot folly as it flies. In many trades are men who are merely skilled laborers, some automatons passing under the terms machinists, molders, printers, etc. The employers have created the evil and the employees have intensified it. In the end, it will prove to be so much of a stumbling-block that advocates of specialization will have to depart for the Orient, where such modern business methods are transformed into a Faith, so that criticism is unwise even if right. The average American brain is adaptable, but for a lot of human sticks, take stock of the European rubbish dumped into this country to displace a better element of mechanics and citizens. "Seg."

FINDS TRADE CONDITIONS POOR.

Editor "Domestic Engineering":—After an absence of nearly twelve months from the plumbing business, I have taken stock as to how the conditions of the trade compare with those that existed when I was actively engaged in it. I find after visiting many cities in our country, that trade-conditions are worse in big cities than in small. Too much business is run upon the five per cent profit basis. The quoters of such absurd figures are still under the delusion that profit is possible, and unfortunately their delusion is contagious. Such error can only lead to bankruptcy, ruin, soup-house and panic.

Apparently, many men lose their senses when confronted with a big contract. What do you think of a recent case I discovered, in which the plumber quoted on one lavatory instead of nearly 300? It seems impossible, but it is perfectly true. You can well imagine that his figure was low. In another case a bid was put in which omitted 54 closets, although they were distinctly shown on the specifications. It certainly is impossible for honest men to compete at profit-making prices, with such careless price-quoters. It is useless to call the attention of the architect and contractor to the fact that such a man's bid was low because of an error in his calculations. All that ever happens is that when the architect and contractor have the next big job on hand they remember previous profit they made at the expense of the low bidder and say, "Send for the fool again."

The disease exists not only among the plumbers and steam-fitters, but even the jobbers have caught the "itch." I had opportunity to investigate a jobber's business recently and found that last year he did $38,000 worth of business at a net profit of a trifle under $3,700. I was told by a prominent architect that over 75 per cent of the business for the plumbers and steam-fitters of the country (but more especially the plumbers) was based upon the gamble that something would be left out by the over-anxious bidder. It is impossible to dignify such work as this with a name of competition. It cannot even be called suicide. Suicide at least removes the one who commits it from the mundane sphere of action, while the bidder of the caliber cited above remains to repeat his injuries to the trade with which he is identified.

What is needed is a concerted campaign of education and an endeavor to secure legislation which shall make criminal the quoting or accepting of values which are known on the face of them to be false and an injustice to their bidders.

Georgia. H. J. K.

NEWS FROM CONNECTICUT.

Waterbury.—The Barlow Bros. Co. has been awarded the contract for plumbing and heating the new building to be erected by St. Mary's hospital on Union street. The building will be used for a home for the nurses and will be modern throughout.

Bridgeport.—John Birmingham is to do the plumbing and furnace heating in a two-family house which is soon to be erected on Howard avenue by Contractor J. J. McFarland.

Manchester.—Olds & Whipple of Hartford are to install a new heater in the Sixth District school, beginning work about October 1st and agreeing to complete it in three weeks. The foundation is now being prepared.

Waterbury.—A new three-family house is nearing completion on Walcott street. L. T. Burns is doing the plumbing. The house is owned by Patrick H. Hackett.

LEGAL DECISIONS

BOARD ACTION REQUIRED ON CONTRACT FOR HEATING APPARATUS FOR SCHOOLHOUSE.

Under the New Jersey statute which provides that, "No contract shall be entered into by a board of education * * * until the same shall have been presented and passed on at a regularly called meeting of the board," the Court of Errors and Appeals of that state holds, in American Heating & Ventilating Co. vs. Board of Education of Town of West New York, 79 Atlantic Reporter, 313, that a contract for a heating apparatus to be installed in a schoolhouse can be entered into by a board of education only when the same has been presented and passed upon by the board at a regularly called meeting. It is not competent for the board to abdicate this duty by delegating to its president and clerk authority to enter into such a contract on its behalf. For example, it was not enough that a contract was signed by the president and clerk of the board and the corporate seal affixed by the latter in pursuance of the authority given by the following resolution which appeared in the minutes of the board: "Be it resolved, that the * * * heating, ventilating and sanitary system be and it is hereby adopted as the heating, ventilating and sanitation system to be installed in the school building to be erected and known as 'Public School No. 5.' And be it further resolved, that the architect of said school building be and he is hereby instructed to incorporate in his plans and specifications the above-named system. And be it further resolved, that the president and clerk of this board be and they are hereby authorized and directed to enter into a contract with the * * * company for the installation of the said system in the said Public School No. 5." The court says that a mere reading of the section of the school law already quoted makes it clear that nothing that the president and clerk might do under this resolution would make a contract on behalf of the board "until the same has been presented and passed on a regularly called meeting of the board."

PLUMBING COMPANY NOT LIABLE FOR INJURY FROM TRAP-DOOR LEFT OPEN.

A proprietor of a large store employed a plumbing company to send a workman to his store for the purpose of descending into the cellar and putting in a water-pipe. The only entrance to the cellar, which was dark, was a trap-door in the floor of the store. The workman sent to fix the water-pipe descended with his lantern and tools into the cellar, and went to work. The trap-door was not closed after he descended into the cellar, and an employee in the store in passing by fell in and was injured. He sued the plumbing company for damages, and recovered judgment. But that is reversed by the Supreme Court of North Carolina. The court says, Howard vs. J. H. Harris Plumbing & Supply Co., 70 Southeastern Reporter, 285, that there was no evidence of negligence upon the part of the plumbing company. It obeyed the call and sent one of its workmen to the store as directed. It was the duty of the proprietor of the store to conduct the workman to the place where the work was to be done. It was his store, and he had complete control and management of it. He knew the way into the cellar, and the workman did not. The proprietor was offered as a witness for the plaintiff, and admitted that he undertook that duty. He directed one of his clerks to show the workman the way into the cellar through the trap-door. When he delegated that duty to his clerk, he was responsible for the manner in which he discharged it. When the workman lighted his lantern and descended by the ladder into the cellar, it was the clerk's duty either to close the door, or, if necessary to leave it open while the work was being done, to protect it so those passing by were not likely to fall into the cellar. Taking the evidence in its most favorable view for the plaintiff, the court is unable to see any negligent act upon part of the plumbing company. The proximate cause of the injury was the neglect of the proprietor's agent after conducting the workman (as directed) into the cellar, and after the workman was down in the cellar, in failing to close the trap, as it was his duty to do so.

SUGGESTION ON PLUMBERS' ACCOUNT.

In an action by a firm engaged in the plumbing business to enforce a mechanic's lien for furnishing, as subcontractors, material and labor in putting in the plumbing in a house, the Kansas City (Mo.) Court of Appeals says, Feeny vs. Rothbaum, 137 Southwestern Reporter, 82, that the items in the account, "Water Company, $4.75," and "lead in street, $7.50," were so indefinite and unspecific as to be improper as against the owner in a bill by a sub-contractor with whom the owner had not dealt, and who must get his information from the account. The same might also be said of the item "Laborers' time, $25." There was necessarily much labor of different kinds. It was explained in evidence that this particular item was for digging in the street to connect pipes. If so, it should appear in the account. If the face of the account showed that the labor could refer to but one thing, it would be a different question. The court further holds that if the item "lead in street" had been stated so as to be understood, and it was thereby seen that it connected or was used in connecting the water, gas, or sewer with those pipes in the street, it would be lienable.

The items "plumbing permit, $5; sewer and water permit, $2," were shown at the trial to mean a special license from the city authorities to do the plumbing, and a permission to connect with the sewer and water pipes in the street. The Missouri statute allows a lien for "work or labor done, or materials, fixtures, engine, boiler or machinery furnished." A permit or license issued under the police power of a municipality is not embraced in these provisions.

"Drayage" might well be classed as a part of the labor; and "plumbers' time" could only be understood as the time they were engaged in labor at the work of which the account, as a whole, was the result. It was specific in that it designated the kind of labor.

The petitioner alleged that within four months after the account "became due" it filed a statement, etc. The allegation should have been that the account "accrued." The statute so requires; and this court has held that there is a material difference between the two words "due" and "accrue." An account may accrue long before it has been stipulated that it is to be due and payable.

Wentworth Institute

The New Industrial School of Boston

Two courses are open to the young man who has a liking for mechanics and who wishes to learn a trade. He may enter the plumbing shop as a helper, or apprentice, and pick up his trade as he can, learning it chiefly by imitation and without instruction, making from month to month little or no progress and finally becoming a mediocre workman; and, secondly, he may avail himself of the opportunities of a trade-school education in order to get an intelligent and thorough instruction in both the theory and the practice of his trade, so that he may know not only how work is done but also why it should be done in a given way.

It was to offer opportunity for young men to train themselves to be efficient workers in trades requiring skill and intelligence that Arioch Wentworth, a citizen of Boston, Mass., determined to devote the greater part of his fortune. By his will, something over $3,500,000 has been made available to endow a school whose purpose is "To furnish education in the mechanical arts."

The Board of Directors of Wentworth Institute, as the new school is to be called, have conducted an investigation for several years to determine the most suitable type of educational scheme to adopt, and about two years ago architects were employed to prepare working drawings for the first group of buildings and the general plan for the future growth and development of the institution.

This initial group of buildings is now complete. The equipment is rapidly being assembled and put in place to be ready for the official opening which takes place on September 25th of this year. This new school is of especial interest because its plan is somewhat unique. No other single institution of importance is devoting its whole energies to the type of work which Wentworth Institute has selected for its field. Its aim is to teach trades and to train young men to be foremen and superintendents in building construction and in manufacturing industries.

"The school is intended primarily," said Mr. Williston, the principal, "for young men who are already employed in industry and also for those who want to train themselves for entering either manufacturing trades or building trades with some practical skill and also with a good earning power at the start. This, of course, means that they must be mature and dependable—the kind of young men that employers are anxious to secure."

The demand for this kind of work is very great, and it is interesting to note that already over 600 individuals have applied for admission; and, at the rate the applications are coming in, 800 or 900 students will have registered by the time the school opens, the last week in September. Most of the applicants are young men between seventeen and twenty-eight years of age who now find themselves entirely outside of the present school system. Very few come from high schools, for high school boys as a rule do not enter mechanical trades. Still fewer come directly from grammar schools, for such boys are apt to be too immature to find ready employment before completion of their courses and are therefore advised to get a year or two of training in higher classes or in practical employment before entering a school of this sort.

The young men who are applying for admission to Wentworth Institute are those who are already engaged in some comparatively unskilled occupation and who find opportunities for advancement so slow and uncertain that they are glad to turn to a school that offers instruction of such a practical character that they can use it immediately in obtaining a higher grade of employment.

For example, under existing conditions the boy who enters the plumbing trade is not even permitted to become an apprentice—he is engaged merely as a helper who is not taught the processes of the trade and has very little opportunity to acquire practice in the use of tools. He picks up the trade through imitation and with little or no instruction in the scientific principles relating to the trade that are really needed to make conditions entirely satisfactory. A plumber with such a training is almost always sure to find himself in a discouraging situation. His wages are small and his work is uncertain and never steady. But how promising is the outlook for the young man who has come to his occupation through the trade school route? Statistics of the United Bureau of Commerce and Labor show that the average wage of the skilled journeyman plumber is $5.39 per day or $32.25 per week, while the unskilled workman earns $1.90 per day or $10.75 per week; in other words, the technically trained man earns three times as much as his untrained brother. The boy of today with a liking for mechanics, who expects to enter the machine industry, can do far better in a well-equipped modern trade-school. Experience has shown that a year in such a school is the equivalent of at least two, and, oftentimes, three years in the school shop. And, moreover, for the young man who has taken such a course in a good school, there is likelihood of greater ultimate advancement in positions of responsibility than could be expected by one whose training had been entirely in the shop. This, of course, would not be true unless the school were one with an intensely practical aim.

As to the methods of instruction that are planned for Wentworth Institute, it is proposed to keep the boy in an ideal modern shop just one-half of his time, while the other half of the day will be spent in drafting, practical mathematics, strength and property of materials, mechanics, elementary electricity and similar applied subjects that are directly related to his particular trade. The time will thus be equally divided between actual trade work and the broad general science of the trade. The shops will be equipped with the very best makes of modern tools and apparatus for teaching the essential scientific principles.

For example, the plumbing shop will be equipped with about 48 benches and special department for running cast-iron drain-pipe, vent-pipe, etc., a number of small rooms arranged in tiers over one another which will make possible the complete installation of fixtures such as would be found in the ordinary dwelling house; and in addition there will be in the plumbing department a considerable floor space set aside for the testing of plumbing systems, studying the siphonage of traps and the other essential principles of sanitary engineering that the competent, intelligent plumber should be familiar with. In such a shop a boy can get all of the advantages of the experience that he would get in a commercial shop in addition to the advantage of having an instructor who is constantly interested in his progress and promotion.

The power plant, too, is notable, because it is very beautifully designed. Its exterior is in harmony with the very pleasing group of buildings which the architects, Peabody

and Stearns, have designed for the Wentworth. Its interior is large, roomy, clean-cut and beautifully arranged, and of sufficient size to accommodate the expected growth of the institute for many years to come.

To the students of the institute, this power plant will be valuable not alone, however, as an example of all that a power plant should be, but also as a working laboratory. One of the great ideas which has been kept in mind in planning the Wentworth Institute, is to make the laboratories, shops and class-rooms not too distinct—to make them all co-operate and contribute to a single purpose—giving in each of them instruction which is directly related to the chosen occupation of each pupil. It is to be understood that the laboratories and the shops are the class-room, in which most of the instruction is given, and in which the theoretical principles are illustrated and explained in the most realistic fashion.

Instruction in the principles is given not upon specially designed or peculiar apparatus but, in every instance, upon the very machinery which the students will be required to handle or operate as expert mechanics. The students themselves, under the guidance of their teachers, will construct and erect in the laboratories, machinery and apparatus which they will subsequently test. The instruction is thus made more interesting, the machinery is used to better advantage, and the students obtain a more real, intimate and practical knowledge of the work he is to do.

With this idea in mind, the laboratories for studying the operation and testing of steam and gas-engines and boilers, and electric generators and motors, will be housed in the power-plant building, close to the boilers, engines and generators which actually serve the institute shops. The installation now being made consists of a 230-h. p. water-tube boiler, manufactured by the Babcock & Wilcox Co. and a 300-kw., 220-volt, direct-current generator by the Westinghouse Co. direct-connected to a simple-expansion corliss-type steam-engine made by C. & G. Cooper, Hamilton, O.

There is space in the engine room for future units to develop several times this amount of power, as soon as the institute shall demand it. Over the engine room, provision is made for a traveling crane for mechanical handling of apparatus.

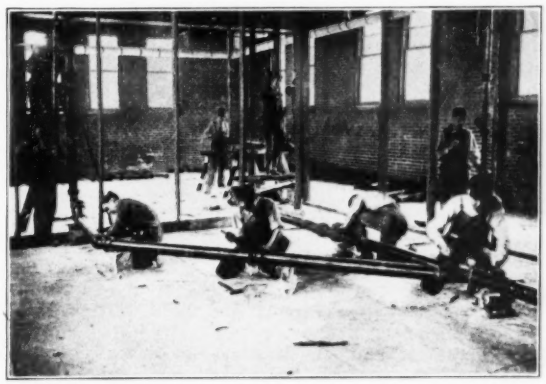
The engine room also contains the dynamo-laboratory, which consists of a group of both direct and alternating current-generators and motors, and transformers, of all types used in commercial work, carefully selected for studying the operating characteristics of electrical machinery.

The tremendous increase in the application of electric motors for driving shop tools, and of electric power for locomotives and automobiles, as well as lighting and communication, make it necessary that every skilled workman, in almost any trade, have at least a slight acquaintance with electrical generating and power machinery, so that he may have a sense of what it is reasonable or unreasonable to expect of any given machine, and know how to recognize and remedy simple troubles in the electrical machinery he uses or is responsible for. This much may be required whether he works in the machine shop, wood shop or foundry. The electrician must be given further instruction, because the motors, generators and other apparatus are the tools he works with, and he must know their habits and peculiarities so as to be able to apply them properly, and to know when they are misapplied. Experience will be given in tracing and remedying troubles and faults in electrical machinery and distributing circuits, in addition to performance of all the usual shop tests on electrical equipment.

Location of the Site.

The site of Wentworth Institute is on Huntington avenue directly opposite the new Museum of Fine Arts, and contains between 12 and 13 acres of land. It faces the Fenway park and is in the immediate vicinity of Symphony Hall, the new opera house, Simmons College, the Boston Normal School, the medical schools of Tufts College, Harvard University and the Young Men's Christian Association.

In the district directly to the south of the site extending toward Roxbury are a number of large factories, and there is prospect of the location of many others in the



Plumbing Students Calking Cast-Iron Drain-Pipes at the Wentworth Institute, Boston.

not distant future. This gives added value to the location as a place for instruction in the mechanical arts.

Buildings Already Completed.

Wishing to leave the principal of the endowment unimpaired, the trustees waited until last October before breaking ground for the erection of the buildings and in this way have utilized only the income from Mr. Wentworth's legacy. The school opened its doors the latter part of September. Particular attention was given to the building of the foundry and the main shop building, which is 145 x 40 ft. In this building, which is five stories high, windows occupy two-thirds of the wall space, thus insuring to the occupants the maximum amount of light. In this building also is located the carpenter shop, pattern shop, machine shop, blacksmith shop, plumbing shop and electric wiring room. Other space here is utilized for smaller shops used in the list of courses in applied science and ample space for thorough demonstrations of electrical appliances, power-plant operation and building instruction is also available. Extending to the south of the larger building is a small wing containing administrative offices and further the power plant, 80 ft. square. Outside the equipment the buildings have cost $350,000 and as yet form but a small part of the original plan of the architects. Working drawings have already been prepared for another large building and the demand for the type of instruction that Wentworth Institute offers is already so great that it is probable that still further additions will soon have to be made.

Courses of Study to Be Offered.

Both day and evening courses will be offered. The day courses are of two types—short one-year courses, and more thorough two-year courses. The one-year courses are intended for persons having little or no experience,

and, although no examinations will be required for entering, the student will have to satisfy the principal that he is fitted by natural inclination and previous experience to succeed in the course planned.

The two-year courses are intended for young men who wish to attain advanced positions. The graduates from these courses will be prepared to fill positions as inspectors, testers, erection foremen, and foremen of departments in mechanical and electrical manufacturing companies, and corresponding positions in similar industries. For such positions there is a great demand for men of practical skill who know how to work efficiently with their own hands and who have a sufficient knowledge and training always to do the right thing at the right time in the right way. The wages that such men command are always good, and the likelihood of ultimate advancement into positions of responsibility for those who, with experience, develop judgment and skill in directing the work of others, is excellent.

Low Tuition.

The large endowment fund left by the originator of Wentworth Institute does away with any necessity on the part of the student to pay the whole or even a part of the expenses of instruction. If a tuition-fee sufficient to cover the cost of instructors were to be charged it would frustrate the plans of the school for teaching working boys or men in smaller positions. On the other hand, if no fee at all were charged some might apply who had little or no real interest in the work. The fees are $6.00 per term for day students and $6.00 per season of two terms for the evening students. Said Mr. Williston, the principal: "It is expected that the endowment which Mr. Wentworth left should pay the cost of instruction, and there is no thought in the mind of directors of the institute that the student should pay even any considerable part of the expenses of instruction."

Part-Time Courses and an Employment Bureau.

The directors of Wentworth Institute have also inaugurated part-time courses in addition to the regular full-time courses. These part-time courses require the students to attend their classes at the institute every other week, but during the alternate weeks to give them opportunity to work at some regular employment. This will make it possible for them to earn wages while attending school and to pay for a portion if not the whole of their living and school expenses. Another interesting feature at Wentworth Institute is the employment bureau. Colleges of engineering have in an unofficial way done much toward securing good positions for their graduates, and in many instances a considerable degree of their success may be attributed to the skill and judgment with which this has been done, but this is about the first instance, so far as we are aware, of an educational institution publicly announcing that it considers the securing of satisfactory employment for its graduates as one of its important functions.

Instructors.

In selecting a faculty for Wentworth Institute the board of directors searched the country over and visited nearly every one of the important trade institutions. Their choice for a principal finally rested upon Arthur L. Williston, a graduate of the Massachusetts Institute of Technology and formerly a member of the faculty of Ohio State University. He had experience as an engineer on one of the great western railroads and was a member of the commission which established the Carnegie technical schools in Pittsburgh. At Pratt Institute in Brooklyn, N. Y., he was at the head of the School of Science and Technology, which position he retained for 12 years. The success of Mr. Williston at Pratt is at once apparent by referring to the growth in enrollment in number of students and in faculty during the dozen of years of his direction. The total enrollment, for example, for both day and evening courses increased from 332 in the fall of 1898 to 1,200 in the fall of 1909, while the faculty grew from 10 in number to a corps of 34 full-time teachers.

WANTS PUBLIC-COMFORT STATIONS IN ALL CITIES.

The state of Massachusetts has always stood for progress. Its stand in the matter of establishing public-comfort stations in all cities and towns having a population of over 10,000 is no exception along this line, as evidenced by the act published herewith. Master plumbers who read this could probably help to forward this movement in their home cities by cutting this out and pasting it in their store-windows.

Acts of 1911, Chapter 596.

An Act to Provide for the Construction of Sanitary Stations in Cities and in Certain Towns in Massachusetts.

Section I. In every city and in all towns having a population of over ten thousand inhabitants, there shall be provided in some convenient place or places, at or near the business center of the city or town, one or more sanitary stations with separate water-closets for the use of both sexes, which sanitary stations shall be established and maintained by the city or town in which they are located. The number and the location of said sanitary stations shall be determined for every city, and for every such town, by the local board of health: provided, however, that if in the opinion of the board of health of any city or town such sanitary stations are not necessary in that city or town such city or town shall not be required to provide the same.

Section II. This act shall take effect on the first day of September, nineteen hundred and eleven.

(The foregoing was laid before the Governor of Massachusetts on the twentieth day of June, 1911, and after five days it had "the force of a law," as prescribed by the constitution, as it was not returned by him with his objections thereto within that time.)

NEW BUSINESS VENTURES.

New York, N. Y.—The H. G. Smith Co. has been incorporated with a capital of $12,000 to conduct a heating and ventilating business. The incorporators are: Howard G. Smith, 128 Fort Greene Pl., Brooklyn; Alfred A. Driggs, Mountain View, N. J.; Richard L. Phillips, 2 E. 128th St., New York City.

Lakeview, Ore.—Henry Bolvin is making arrangements to open a plumbing establishment here.

Garrett, Ind.—T. E. Carper has opened a plumbing establishment here.

Ames, Ia.—The McCaulley Plumbing Co., of Des Moines, has purchased the plumbing and heating business of E. C. Wonderlich in this city. The transfer took place last week.

Fort Worth, Tex.—Phil Gaither, formerly secretary of the city water-works, Fritz Delfs, formerly city plumber, and W. B. Smith have formed a partnership and will soon open a plumbing establishment here.

A Schmoke Conschumer.

A German factory foreman is explaining things to a professor from a German polytechnikum:

"Sehen Sie, Herr Professor, dies ist unser boiler-room. Die andere leut usen buckwheat and pea-coal, wir usen aber blos screenings und dust coal. Dann sehen Sie die pipe die unter den boiler runnt da haben wir fuenfzig pounds life steam pressure, das blowen wir in das fire und es acted als a schmoke conschumer."—B. L. T. in "The Chicago Tribune."

The Boss Talks to His New Foreman About Heating

Written by T. Twice

V.

How do you figure condensation in radiation and piping and expansion in piping, did you say, John? Well, now, that calls for the use of a steam table, and here is one that you will find useful in your business:

Steam Table Showing Temperature and Volume.

Pressure	Temp.	Vol. of 1-lb. steam in cu. ft.	Pressure in lb.	Temp.	Vol.
12-in. vacuum	137 deg. F.	135.0	40	286.5	7.73
10-in. "	160	78.3	45	292.2	7.11
8-in. "	175	55.9	50	297.5	6.61
6-in. "	187	43.6	55	302.4	6.16
4-in. "	197	35.8	60	307.1	5.77
2-in. "	205	30.6	65	311.5	5.43
0-lb. pressure	212	26.36	70	315.8	5.13
1-lb. "	215	25	75	319.8	4.86
2-lb. "	219	23	80	323.7	4.63
3-lb. "	222	22.3	85	327.4	4.41
4-lb. "	224	21.2	90	330.9	4.2
5-lb. "	227	20.16	95	334.4	4.02
10-lb. "	239	16.3	100	337.6	3.83
15-lb. "	249	13.7	110	343.9	3.57
20-lb. "	258.7	11.85	120	349.8	3.33
25-lb. "	266.7	10.36	130	355	3.1
30-lb. "	273.9	9.34	140	360	2.92
35-lb. "	280.5	8.45	150	365.7	2.75

Suppose you wish to find the condensation per hour from a job in which the radiation (including 10 per cent added for mains) figures up 4,900 sq. ft. Figuring your condensation at .3 lb. of steam per hour per sq. ft. of radiation, we have 4,900 × .3 = 1,470, total pounds of steam condensed per hour.

Suppose your steam to be 2-lb. gage pressure, we then have 1,470 × 23 = 33,810 cu. ft. steam used per hour.

By referring to column 3 in the steam table, we see that the volume of 1 lb. of steam at 2-lb. gage pressure is 23 cu. ft., then, as one cubic inch of water is converted into one cubic foot of steam at 2-lb. gage pressure, it follows that one cubic foot of steam will revert back to one cubic inch of water when condensed; therefore, 33,810 cu. ft. of steam will condense into 33,810 cu. in. of water, and dividing 33,810 by 231 (231 being the cubic inches in one gallon) = 146.4 gal. approximately.

With steam at higher pressures, the condensation would still be at the rate of .3 lb. per sq. ft. per hour, but the gallons of condensation would be less, as the steam occupies a smaller space at a higher pressure and therefore the volume per pound will be less, but the steam will have a higher temperature. For instance, if we have steam at 50-lb. gage pressure, its volume is only 6.61 cu. ft. and if we take the same amount of radiation, we have 4,900 × .3 = 1,470 lb. steam condensed per hour, and 1,470 × 6.6 = 9,716.7 cu. ft. of steam per hour and 9,716.7 cu. ft. will revert to 9,716.7 cu. in. of water, and 9,716.7 ÷ 231 = 42 + gal. Note the difference in gallons condensation between steam at 2-lb. pressure and steam at 50-lb pressure for the same amount of radiation. You can very readily see, John, why smaller piping can be used for high-pressure steam work than for low-pressure work. We will take up the matter of high-pressure work later on. Return pipes carrying water only, can be very much smaller than are commonly used, but in actual practice, owing to the danger of stoppage by rust, core sand, etc., it is seldom good policy to make a return pipe smaller than 1 in. in size, and if of any considerable length, or buried under floors, it is good practice to make the return one size larger than what you would use were the pipe above the floor. Merely a safeguard against having to renew the pipe sooner than would be required with a larger pipe, as the larger pipe partially acts as a scale-pocket. You want to always make provisions for draining underground piping when necessary. Your assuming .3-lb. condensation per sq. ft. per hour as the work done by your radiation, will leave you a factor of safety, as the actual condensation is closer to .2-lb. per hour than .3-lb. after the job is warmed up. Regarding expansion in piping, and you must make some provisions for expansion in nearly all your steam work, the following table will come in handy for quick reference, but I would advise you to remember the rule, and you will be able to figure the expansion under any conditions.

Table of Expansion in Wrought-Iron Pipe.

Temp. of air when pipe was fitted.	Increase in length of pipe in inches per 100 ft., at the following temperatures.									
				0 lb.	5 lb.	10 lb.	15 lb.	20 lb.	25 lb.	30 lb.
	160°	180°	200°	212°	227°	239°	249°	258°	266.7°	273.7°
0° F.	1.28"	1.44"	1.6"	1.69"	1.82"	1.92"	2."	2.07"	2.13"	2.2"
32° F.	1.02"	1.18"	1.34"	1.43"	1.56"	1.66"	1.74"	1.81"	1.87"	1.94"
64° F.	.77"	.93"	1.09"	1.18"	1.31"	1.41"	1.49"	1.56"	1.61"	1.69

Rule for Finding Steam Pressure Expansion in Pipe in Inches per 100 Ft. Length.

Four-fifths of the increase in temperature of the steam or water it is subjected to, over the temperature at the time of installation, divided by 100, equals the expansion in inches per 100 ft. (4/5 equals 80 per cent, or .80).

Example—Temperature of pipe when installed, 32 deg.; steam pressure, 10 lb., equals 239 deg.; 239-32 equals 207 deg. difference; 207 × .80 equals 165.6 divided by 100 equals 1.656 in., equals the expansion per 100 ft. Suppose the length of the pipe you wish to find the expansion in is 43 ft. As the rule works on 100-ft. lengths, and 43 ft. is 43 per cent, or .43 of 100 ft., by multiplying the expansion for 100 ft., 1.656 by .43, we get .71208, or roughly, not quite ¾-in. expansion. As the rule works on 100-ft. lengths, you can readily see that you can find the expansion for any length by converting the feet-length into decimals of 100 ft., and multiplying the expansion per 100 ft. as explained above. Figure a few problems, John, and get this clear in your mind. I move that we quit for tonight and go home and get acquainted with our families.

(To be continued.)

NEW ENGLAND NOTES.

Massachusetts.

Newburyport.—The Hub Plumbing & Heating Co. has been given the contract to install a new system of heating and ventilation in the Curtis school building. The only other bidder for the work was the Albert Russell & Sons Co., whose figures were higher.

Easthampton.—The contract for plumbing in the new high-school building has been awarded to C. C. Coates.

Gardner.—P. S. Carey has been awarded the contract for the plumbing in the new residence which is being erected for Walter J. Whitaker. He will also install the heating fixtures. Mr. Carey also has the contract for replumbing the Garland block.

Watertown.—The contract for the installation of a new heating plant in the police station has been awarded to Charles Glover, who was the lowest of three bidders.

Boston.—The city council has passed an order requesting the mayor to investigate the building department with a view to ascertaining whether or not the gas and plumbing inspectors are permitting unlicensed men and boys to work on city contracts. The order was offered at the request of the gas-fitters' and plumbers' unions, who intimated that such was the case.

Worcester.—A permit has just been issued by the superintendent of public buildings for the erection of a central heating plant for the Boston & Albany railroad, to be used to furnish heat and power for the new Union station and other railroad buildings.

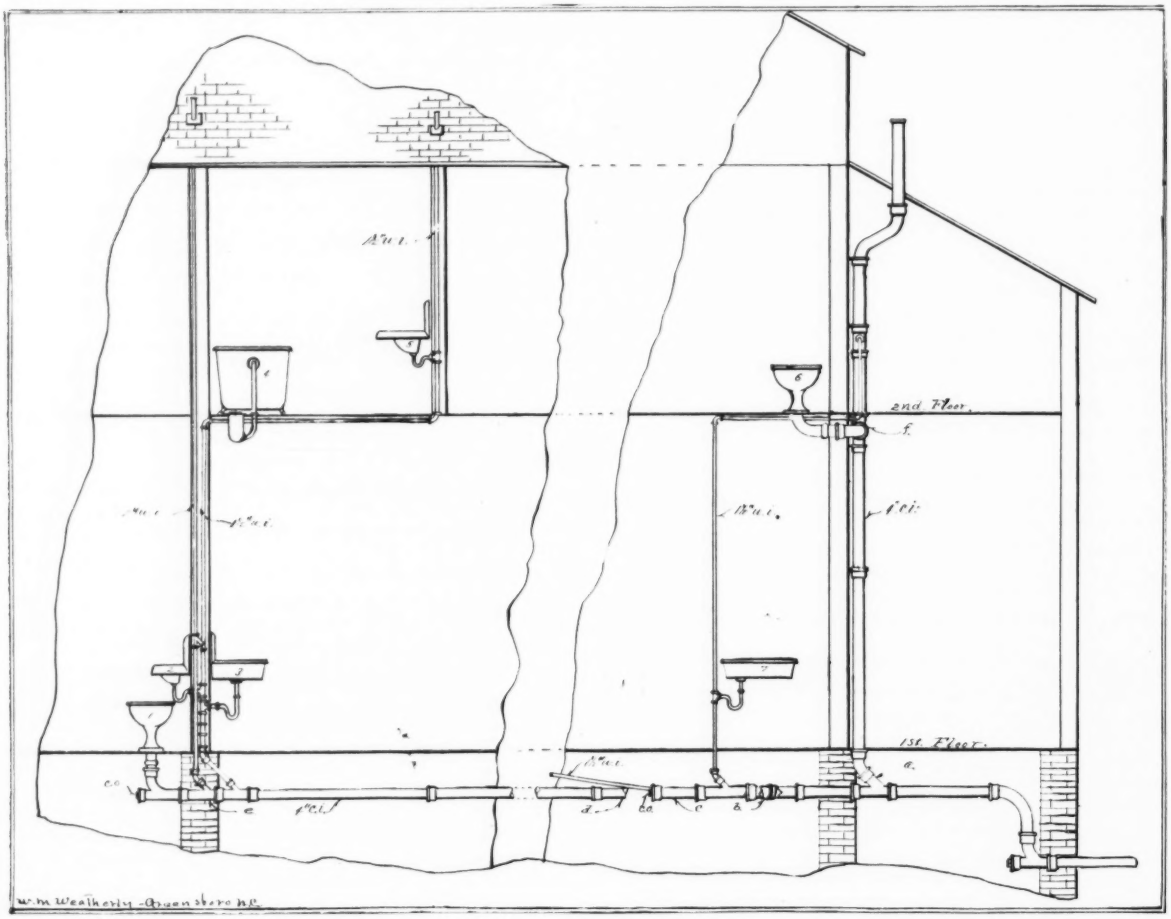
QUESTIONS AND ANSWERS

THE ARCHITECT AND BUILDER SHOULD HAVE OR BE GUIDED BY FULL PRACTICAL KNOWLEDGE OF PLUMBING REGULATIONS.

Editor "Domestic Engineering":—For what advance it may bring to some one and the sanitary conditions of plumbing, in the interest of the public, I wish to call your attention to some work as done in a residence, Greensboro, N. C., as outlined according to drawing shown herewith; not to condemn, but if possible show where we can improve, for if we content ourselves to believe our fathers were perfect in all they did, we will never progress.

As a matter of fact I asked why the 4-in. stack connected into 4x4 Y (a), was not extended from 4x2 Y (e), as it is about 20 ft. from fitting (a) to fitting (e), and about 12 ft. from fitting (a) to fitting (f) which takes water-closet No. 6, and according to theory, practice and experience, more perfect circulation would have been the result.

You will notice that the 2-in. wrought-iron vent connected into the fitting (e), must carry the volume of 20 ft. of 4-in. pipe in a horizontal position, while a 4-in. pipe carries the volume of 12 ft. from fitting, (f) in a vertical position. If a 4-in. vent were extended from fitting (e), the vent from fitting (f) should be reduced and the law of circulation more correctly met, even to make the vent from fitting (f) 2-in. as it now is, and leave the 2-in. vent from fitting (e); as the air coming in from waste-line will naturally seek the first and easiest pass upward. In this case, as shown, the 4-in. from fitting (a) will carry



Plan of Plumbing System Installed in a Residence at Greensboro, N. C.

nearly all the air as the 2-in. vent from fitting (e) is about the same height as the 4-in., thus leaving the air in the waste-line and vents beyond the 4-in. stack dead and moved but little only by the action of fixtures when in use.

The answer from the mechanic on the job, in reply to the question, "Why this arrangement?" was: The partition at water-closet No. 1 would not take a 4-in. pipe and the owner does not want pipe exposed. **The architect and builder should meet this demand, in design and con-**

struction. For the architect and builder to know or to be guided by such knowledge as to size and number of pipes and their location, would greatly add to the sanitary and economical placing and working of plumbing. Work can be done more easily, quicker, more satisfactory and sanitary by this advance knowledge with the architect and builder.

I do not know of any part of the completing of a building, more neglected in development of successful operation and use than the plumbing. This is being overcome, I am glad to say, and we must demand it the more. That we may come to a more general understanding, so far as possible in meeting this, like material and laws should be had so far as practical, and then the architect and builder could meet the necessity, but as it is, the varied make and size of roughing material keeps him from trying to meet the demand, for he may make his measurements for one size and the man who gets the work has another to place which will not take the space as designed.

Referring to the plan, it will be seen that two 4x2 fittings are used beyond the 4x4 fitting (b), which takes waste-line (d). These two fittings take the waste from fixture No. 7 and one not shown. The question here is, would it not be more sanitary to have these two fittings 2x2 than 4x2?

The 1½-in. continued line taking bath No. 4 and lavatory No. 5 has in my own experience proved safe; being more economical in expense and more lasting from a point of sanitation.

These are points mentioned, that may help us to advance in doing good sanitary and economical work, and there are other points that may be brought out from this one job, by being placed before the public.

Greensboro, N. C. W. M. Weatherly.

CONSIDERS IT AN UNUSUAL JOB.

Editor "Domestic Engineering":—Sometimes ago I was sent out to a house to make some repairs in the plumbing, and while there the owner asked me to examine his bath-tub and see why a certain amount of water always backed up into the tub. I have never run across a job of this kind before and would like to know if you can tell me what to do. There is a sink on one side of the wall and a bath-room on the other side. The sink has a trap and there is a drum-trap in the bath-room.

Milwaukee, Wis. N. R.

LOCATION OF WATER STORAGE-TANK.

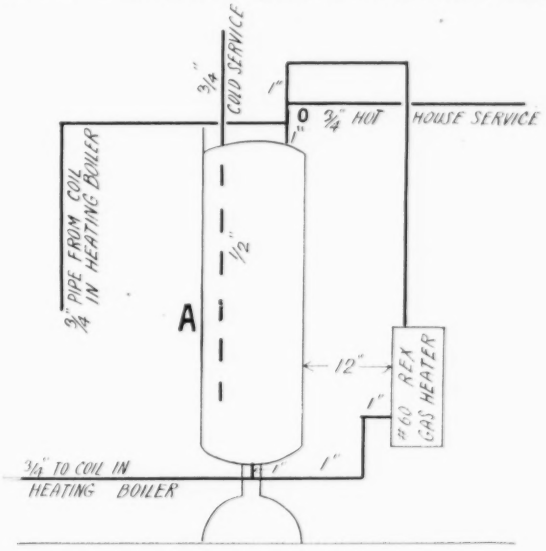
Editor "Domestic Engineering":—I am about to set a storage-tank for a pneumatic water-supply system for a customer. He insists that the tank be buried out in the yard. Do you think it the best plan?

Pittsburgh, Pa. J. C. Wood.

We have seen tanks sunk in the ground as mentioned. The writer, however, when installing a system has always preferred to put the tank in the basement on account of the ease in getting at it. In some of the larger installations we believe that the tanks are placed outside the building, but so set that they can be got at readily. On a small job we should hesitate to sink the tank in the yard, where it could not be reached quite easily in case anything should go wrong. The tank can be set in one corner of the cellar and will not require much room.

GAS WATER-HEATER FAILS TO DO ITS WORK.

Editor "Domestic Engineering":—I am enclosing a sketch of a range-boiler with a gas water-heater connected to same. Will you kindly tell me how I can make this job work right? The heater heats the water in the boiler (30 gal.) taking one and a half hours to heat it all. The water, as it becomes hot in the range-boiler, backs down into the ¾-in. circulating pipe from coil into the heating boiler. When the bath faucet is opened the water starts leaving



Gas Water-Heater Installation That Fails to Work Right.

the boiler and also at the same time flows through the gas-heater and through the coil in the house-heating boiler along with the hot water from the upper part of the range-boiler to the extent that the water passing through the two circulating pipes tempers the hot water with cold and at last cold water only flows from faucet while there is still some hot water in the range-boiler. I hope you are able to tell me what to do to make it work right.

Michigan. O. E. G.

On looking over the sketch sent by the correspondent and from the information given by him, it would appear that the easiest and most sensible thing to do would be do disconnect at point now marked "O," and insert a "plug," in the side of the tee, not touching gas heater pipe. Then let the ¾-in. pipe that entered at "O," enter the range-boiler after the usual manner, at point marked "A."

If this is done (and it would be a very easy matter so to do) the water from the gas heater will have no chance to run back. At the same time, unless there is something not explained at this time, the coil from the heating boiler will no doubt heat the range-boiler just as well.

THE REASON WHY.

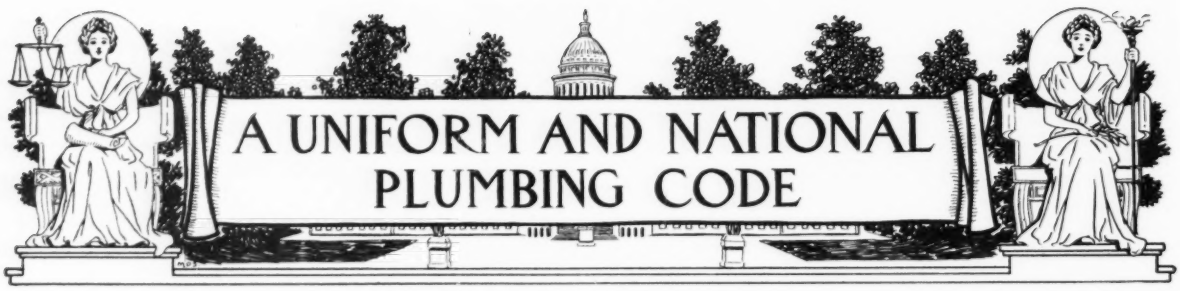
See the girl!

The girl is falling upon the neck of the man.

Does the girl fall upon the neck of the man because they are alone in the gloaming?

Partly.

Chiefly, however, the girl falls upon the neck of the man because she is learning to ride the bicycle, and the man is her instructor, and she chooses to fall on any neck rather than her own.



By Henry D. McCormack, C. E.

XVII.

Soil, Waste and Vent Stacks.

In considering the subject of soil, waste and vent stacks and pipes, we come to a part of the drainage system about which there has been more difference of opinion, controversy and "stand-pat-ism" than about any other part of the installation, and all of this disagreement is due primarily to the fact that those taking part in the controversy believe there is one way and one way only to do plumbing work. They fail to bear in mind that plumbing has changed greatly from what it was 20 and more years ago, and is changing every year, every month, almost every day, imperceptibly but surely. Within the last 20 years many truths have been discovered which upset the theories on which plumbing practice was formerly based, and, as a result the design of plumbing installations is in a more or less transitory state, out of the confusion of which these separate, different and distinct systems of house drainage stand out in bold relief.

The first and best known is the old revent system, with its muliplicity of pipes, joints and fittings; the second is the continuous or loop system of ventilation, now extensively used instead of the two-pipe system; lastly comes the one-pipe system, which is the simplest of all, and the one to which there is the most objection. No doubt in the course of time these three systems will be modified, improved, and combined until the ideal system becomes a composite, embracing all three systems, or the best elements from each of them.

In writing an original plumbing code, or revising an old one, the framers and others interested in good plumbing should not pin their faith to any one system in particular and think of any other systems proposed as substitutes to take the place of the original and be used exclusively in its stead. They must consider them as alternatives, any or all of which are perfectly sanitary and satisfactory. For instance, taking the three systems of piping mentioned in the foregoing paragraphs, they must remember that each of them is perfectly sanitary, and that all they are expected to do is permit the installation of any and all three systems, leaving it then to the designer or owner which of the three to adopt. To hold the building public down to any one system is wrong in principle and leads to the poorest results, for with an experience of over 25 years the writer can truly say that he does not stick to any one method in preference to the others, but in every installation uses for each stack the method which in his judgment will give the best results, even carrying this practice to such an extent that the three systems are often used in one building, being blended and harmonized together to get the best results at the least cost.

Anybody who stands pat, insisting that one system of plumbing and one system only shall be used, is an obstructionist standing in the way of progress, and we have no place among compilers of codes for that class of people. If the methods they oppose, assuming of course they have the backing of experience and suitable authority, seem to them so opposed to sanitary principles as to be unworthy of approval, the very best way to prove their case is to let the advocates have their way. Bad and dangerously defective work is not long in making its presence known, and condemnation will then follow as a matter of course.

Many people connected with the plumbing business either directly or indirectly oppose any method of doing work, or any system of installation, which will lessen the amount of plumbing material used in the installation, foolishly believing that the more they can insist upon, the more it will benefit the craft at large. The better class of plumbers know the fallacy as well as the injustice of that reasoning, and are opposed to the requiring of material just to make work. These latter men are citizens first and plumbers afterwards, and do not want to see the common council fooled into making the progressive and public-spirited citizens, who help the town by building, pay an unnecessary and unjust tribute to the ignorance or greed of the misguided few.

All that a plumbing code can and should exact, is that the plumbing systems be sanitary and safe; as to the relative merits and costs of the various systems, they have no concern so long as they are safe. If then a builder or owner can save a certain percentage by using one system in preference to the others, or by combining all systems in one building, he ought to be permitted to do so.

Ordinarily, where fixtures are grouped together, as they generally are, the loop and the two-pipe system will prove the better method; while in cases where the fixtures are scattered, the one-pipe or the loop system will perhaps prove the more satisfactory. Why then, in compiling a code or revising an old one, should we not recognize the value of each method, and permit all three systems according to the wishes of the owner or the conditions confronting the designer, depending not upon the system of piping but the way the work is laid out in approving or disapproving the plans? Then, insist that before a permit will be issued to do the plumbing in the building, full and accurate plans, details, and specifications be submitted for approval. If full and complete plans and details are submitted, the plumbing inspector can surely see whether the work so laid out is sanitary or not. If not sanitary, it should be rejected, regardless of the system, and, conversely, if sanitary should be permitted, whether the one-pipe system, the two-pipe system or the loop system be shown.

Such a code by its liberality would encourage the progressive few of the trade to study the layout of plumbing installations to see where they could be simplified and bettered. This in course of time would evolve the ideal, the perfect plumbing system, and make wide-awake snap-

py designers of the whole plumbing tribe. There would be an incentive then to study, and it could no longer be said that architects knew more about the business of plumbing than those in the trade. Let us then, in an ideal national code, take the broad, not the narrow view of the subject, and try to bring home to everybody connected with the trade the long overlooked truth that plumbing is not so simple an industry that the work can be done in one stock way, and in one way only. The more advanced codes of the country have already taken this view of the case, and in cities where they are so fortunate as to have modern codes, all three systems of piping are allowed.

Comparing the four codes we have selected as representing geographically the conditions that obtain in the four extremes of the country, we find that two of them, the Minneapolis and the New Orleans codes, permit the two-pipe and the loop systems, while the other two, New York and San Francisco, are "stand-patters" for the two-pipe revent system. According to the New Oreleans code "each and every trap shall be installed on a continuous waste and vent loop or circuit vent systems. Lower fixtures shall be revented at least one foot above height of upper fixtures or independently through roof."

Minneapolis requires that "all fixture traps, except as herein provided, shall be back vented. Back vents shall connect to crown of traps wherever possible, and in no case more than one foot from the trap. Provided, however, that when there is a continuous waste and vent system installed, the trap shall be set as near the fixture as practicable, and the horizontal distance from the fixture to the stack shall not exceed two feet. Wherever a continuous waste and vent system is used, no horizontal run shall be used between waste openings and the water line of the trap, but such branch run shall in every case be installed on an up-grade of at least five degrees."

San Francisco covers the system of venting in the two following sections:

"Sec. 166. As provided for in these rules, all fixtures must be effectively trapped and vented, the traps and vents must be placed as near to the outlet of the fixtures served as practicable, all in conformity with this ordinance.

"Sec. 126. To provide adequate circulation of air, prevent low pressure and to prevent siphonage, special air-pipes of galvanized wrought-iron or cast-iron shall be provided, and excepting as provided for in these rules, they shall be of a bore not less than that of the trap served and if to serve a water-closet or slop-sink, not less than two inches bore."

New York goes more into detail. According to that code: "All traps must be protected from siphonage and back pressure, and the drainage system ventilated by special lines of vent-pipe. All vent-pipe lines and main branches must be of iron, steel, or brass. They must be increased in diameter and extended above the roof as required for water pipes. They may be connected with the adjoining soil or waste line, well above the highest fixture, but this will not be permitted when there are fixtures on more than six floors.

"All offsets must be made at an angle of not less than 45 degrees from the horizontal, and all lines must be connected at the bottom with a soil or waste-pipe or the drain in such a manner as to prevent the accumulation of rust scale.

"Branch vent pipes should be kept above the top of all connecting fixtures, to prevent the use of vent-pipes as soil or waste-pipes. Branch vent-pipes should be connected as near to the crown of the trap as possible."

"Earthenware traps for water-closets and slop-sinks must be ventilated from the branch soil or waste-pipe just below the trap, and this branch vent-pipe must be so connected as to prevent obstruction, and no waste pipe between it and the fixture.

"Earthenware traps shall have no vent horns.

"No sheet metal, brick or other flue shall be used as a vent-pipe."

SALT LAKE MASTER PLUMBERS COMMENCE PREPARATIONS FOR 1912 CONVENTION OF NATIONAL ASSOCIATION OF MASTER PLUMBERS.

The Master Plumbers' Association of Salt Lake City, Utah, at a meeting last week appointed committees to take care of the work of preparing for the 30th annual convention of the National Association of Master Plumbers, to be held in Salt Lake City next summer. The local association plans to outdo all previous efforts in the way of entertainments. The committees appointed are as follows:

Executive Board: Henry Green, chairman; C. J. Higson, F. C. Carthy, W. S. Higham, William Reese, Parley G James and J. R. Reeves. The chairmen of committees are as follows: Finance, I. M. Highley; hotels, C. J. Heesch; souvenirs, A. N. Walsh; badges, P. P. Erskine; reception, all members of the association; ladies' committee, James J. Farrell; halls, Edgar Anderson; meetings, John A. Odin; transportation, Pomery Spencer; entertainment, executive board; decorations, F. F. Lecuyer; printing, Charels Amott; music, George Parfit; press, W. P. Gorman; invitations, Wright Asborne; photographs, T. R. Carns; exhibits, R. Sneddon; resorts, A. E. Hurd; registrations, A. H. Taylor.

LOS ANGELES MASTER PLUMBERS SHOW PROGRESSIVE SPIRIT.

The Merchant Plumbers' Association of Los Angeles, Cal., at a meeting held last week appointed the following members to act as its sanitary committee for the ensuing year: H. Morgan, chairman; J. M. Eustace and J Curtis. Mr. Morgan reports that the committee at once will take up the question of having the city install flowing cuspidors along the streets in the business section of the city. It is the committee's plan to have four cuspidors placed in each block. The first move will be to try to get the public interested by the aid of the Board of Health. The committee will also make an effort toward having all insanitary work in the city made up-to-date and sanitary, and it is asking the plumbing inspectors' assistance, to reach this goal. The Association will hold an open meeting on Monday evening, October 2nd, to which it has invited all the sanitary engineers and the plumbing inspectors in the city. At this meeting the above questions will be brought up and ways and means discussed.

Ontario, Ore.—U. S. Plumbing & Heating Co. of this city has been awarded the contract for the installation of plumbing, heating and ventilating systems in the Holy Rosary Hospital. The consideration is $6,326.

THE METAL MARKET

NO CHANGE IN FOUNDRY IRON.

The course of the pig-iron market seems to have no force behind it and is drifting more or less toward the point of least resistance. Consumption is somewhat larger than two months ago and foundry iron stock has been very well cleaned up all over the country. In the Birmingham market the price continues unchanged at $10.50, with some concessions of 25 cents a ton. At $10 a ton Southern iron is very close to the cost of production and with the northern market limited on account of the higher freight rates southern furnaces are in a most unsatisfactory condition. It is felt that either the demand will have to increase and prices strengthen, or some readjustment made either in the cost of labor or freight rates. The labor question is a pressing one just at the moment and the reduction of wages in the iron and steel industry is being more seriously considered than at any time in a number of years. Foundries in New England are busy and have made some large purchases, but even at this the New York iron trade has not been animated. The defeat of the reciprocity question in Canada puts a damper on the hope of Buffalo furnace-men who expected that they would find a ready market across the border. Quotations are as follows:

No. 2 Southern foundry, Birmingham	$10.25 to $10.50
No. 1 Northern foundry, New York	15.50 to 15.75
No. 2X Northern foundry, New York	15.00 to 15.25
No. 2 plain, Northern foundry, New York	14.75 to 15.00
No. 2 Northern foundry, Chicago	14.50 to 15.00

OLD IRON.

The scrap market is most unsatisfactory. Buyers are declining material when delivered and only accept it at concessions of $1 to $2 per ton. Rolling-mill scrap is extremely quiet and even the foundries are buying cast scrap in only small quantities. Quotations are as follows:

No. 1 yard wrought, long	$11.00 to $11.50
No. 1 yard wrought, short	10.00 to 10.50
Heavy-melting steel scrap	10.25 to 10.50
Machinery cast	10.50 to 11.00
Wrought pipes and tubes	10.00 to 10.50
Malleable castings	10.50 to 11.00
Wrought turnings	6.00 to 6.50
Cast borings	5.50 to 6.00
Stove plate	8.50 to 9.00
Light iron	4.25 to 4.75

QUIET MARKET IN COPPER.

The copper market is less steady, but offers to buy at lower prices have not been taken by consumers. With the general liquidation in securities, there is a feeling that copper prices will go lower. This is not probable, but possible, yet at the same time numerous mines will have to suspend operations should the quotation drop much below the low level of the year. The exports are not altogether satisfactory, being somewhat smaller than a month ago. Electrolytic in wholesale lots is selling at 12.37½ cents and Lake at 12.60 cents.

HEAVY ARRIVALS OF PIG TIN.

It is a buyer's market. The arrivals of tin in this country have been large, amounting to 4,200 tons the first days of the month with plenty of tin afloat, and stocks in New York are ample for the limited demand. Prices have broken rapidly in the London market and this decline has been followed in New York with sales of wholesale lots having been made as low as 38.55 cents, which, although not the low point for the year, is the lowest point reached in the last six months at least. The market at the close of the week was rather firmer, sales being made at 39 cents.

SPELTER.

The market is without change from a week ago at 5.90 cents St. Louis and 6.05 cents New York.

LEAD.

A decline in St. Louis to 4.35 cents had no effect on the Eastern market, as the parity has not been observed for several weeks. In New York the price continues unchanged at 4.50 cents.

PRESENT AND FUTURE MILWAUKEE CONTRACTS.

The county board of supervisors at Milwaukee, Wis., is readvertising for bids for building the sewer in the Grand avenue extension west of the Grand avenue viaduct in Wauwatosa. Martin Plehn is county clerk.

H. E. Briggs, commissioner of public works, Milwaukee, is taking bids for constructing and laying house-drains and water-connections on Mitchell street from Eighth to Muskegon avenues.

Architect Fr. Graf, 520 Matthews Bldg., Milwaukee, is planning a residence for John F. Schwalbach which is to have hot-water heating and plumbing. It will be erected in South Germantown, Wis., where owner will receive bids. W. G. Herbst, 301 Juneau Theater Bldg., Milwaukee, is preparing plans for a flat to be erected on National avenue. Bids for plumbing and hot-water heating will be taken shortly.

Van Ryn & De Gelleke, 725 Caswell Blk., Milwaukee, are the architects for the Superior State Normal School, Superior, Wis., and are preparing the plans for the addition to the school. It will have steam-heating extended, and plumbing. Theo. Kronshage, Milwaukee, is the president of the board of regents.

Waupaca, Wis.—P. C. A. Peterson and Chas. Beacham have formed a partnership and opened a plumbing and heating establishment at 713 Ware St.

Burlington, Wis.—One of the largest and best equipped plumbing shops in southern Wisconsin has been opened by Ed. Zwiebel & Bro., who have moved into the new building erected for them on Chestnut street. The building is 50 ft. by 120 ft., one-story high, and built entirely of brick. The company also deals in automobiles and has its garage and sales-room in the same building.

Fargo, N. D.—T. P. Riley of this city has just completed the installation of plumbing, heating and electric-wiring systems in the new Chemistry Building at the Agricultural College. In this installation Mr. Riley used 3 carloads of iron-pipe, 11 miles of electric wire and 15 tons of lead pipe, which is the largest bill of materials used in any building in this state. A 3-inch gas-main enters the building and supplies 390 gas-taps, which are used in heating retorts and also for lighting purposes. A 2-inch lead water-main also enters the building and supplies 570 water-taps situated in various parts of the building, principally in the laboratory. The steam which comes through the 2-inch main is high-pressure, direct from the boiler house. In this contract the specifications called for the best of materials; and in not a single case did the superintendent of the construction enter any objection to that furnished by Mr. Riley, which speaks well for him as a reliable contractor.

Domestic Engineering "First-Aid-to-the-Injured"

Postal Card Cartoon—No. VII.

Don't be a Squirrel.

WHY DOES THAT SQUIRREL KEEP ON RUNNING AND NEVER GET ANYWHERE ?
GUESS IT MUST BE BECAUSE HE'S JUST A COMMON ORDINARY SQUIRREL
WORKHEAD EXPENSES
POOR ESTIMATING
SUB CONTRACTS
PRICE CUTTING
ROCK BOTTOM
GUESSES
PROFIT NUTS
PROFIT NUTS
I WOULDN'T BE A SQUIRREL FOR ANYTHING. WHEN I RUN, I GET SOMEPLACE. THAT FELLOW MAKES ME PANT TO WATCH HIM
M.D.S.
"DOMESTIC ENGINEERING"

The Nuts are on the Outside of the Cage

If you want to do good team-work in the interests of better prices and prosperous trade-conditions, ask us for some of these cartoons to send to those in the trade who need them. They will be sent free. *These Cartoons have got the punch.*

CENTRAL SUPPLY ASSOCIATION'S ANNUAL MEETING.

The Central Supply Association will hold its 17th annual meeting at the Hotel Sherman, Chicago, on Wednesday, October 25, 1911.

ANNUAL MEETING OF THE ILLINOIS CHAPTER OF A. S. H. & V. E.

The annual meeting of the Illinois Chapter of the American Society of Heating and Ventilating Engineers will be held at Vogelsang's Restaurant, 177 W. Madison St., Chicago, Monday evening, October 9, 1911. Dinner will be served at 6 p. m. In his call for the meeting, Secretary Chas. F. Newport emphasizes the fact that the annual election of officers takes place at this meeting and that it is therefore greatly to be desired that all members of the Chapter should attend.

WILL MANUFACTURE WATER-HEATERS.

The Advance Water Heater Co., Chicago, has been incorporated with a capital of $10,000 to manufacture water-heaters. The incorporators are: P. A. Thompson, C. T. Temple and W. H. Gilbert.

FROST MFG. CO. TO BUILD NEW PLANT.

The Frost Manufacturing Co., Kenosha, Wis., will erect a thoroughly modern plant as the result of the sale of the land and buildings located at Pleasant and Elizabeth streets which it now occupies. The sale gives the Chicago Brass Co. the complete block now occupied by its buildings. The manufacturers of the "Femco" plumbing goods will use the old plant until the new one is ready and the deal will in no way affect or interfere with business.

N. O. NELSON MFG. CO HAS NEW SAN FRANCISCO MANAGER.

The management of the San Francisco, Cal., office of the N. O. Nelson Mfg. Co. is now in the hands of N. E. Olds, and the selling force has been reorganized with the idea of getting a larger volume of the business of this territory than ever before. Mr. Shinn, who filled the position of manager for a time pending the arrival of Mr. Olds, has been made manager of the sales-department. The addition of James E. Britt to the selling-force materially strengthens the city sales-force, for although Mr. Britt has not been in the business for a great length of time he has made quite a record for himself and has a very wide acquaintance in the trade.

WILL DISCONTINUE NEW YORK OFFICE AND PLANT AT MYERSTOWN, PA.

E. R. Euston, vice-president of the Stoever Foundry & Manufacturing Co., who has been in charge of this company's New York office for the past ten years, will remove to its new plant at Easton, Pa., October 2nd. The Stoever Foundry & Manufacturing Co., having been absorbed by the Treadwell Engineering Co., will discontinue its New York office and its plant at Myerstown, Pa., and in the future maintain general sales-offices at Easton, Pa., under the name of the Treadwell Engineering Co., where the line of pipe threading, cutting and bending machines will be manufactured. The company also expects to add kindred lines of machine tools in the very near future.

PERSONAL MENTION.

R. E. Crane, president of Eljer Co., Cameron, W. Va., has just started on his annual fall-trip to the Pacific Coast.

Clarence M. Lyman, for many years salesman in the service of the International Heater Co., Utica, N. Y., but more recently secretary of the Townsend Hardware Co., Oneonta, N. Y., has again joined the International Heater Co's. forces as salesman and advertising manager.

W. L. Waddell, formerly connected with the Fairbanks, Morse & Co., Chicago, has accepted a position in the valve sales-department of the Ohio Brass Co., Mansfield, O.

Ralph Hughes, representing the Becker Mill Co., Marietta, O., has just completed a 30-days' vacation in the wilds of the Canadian woods. He has been studying the secrets of embryonic seat construction close to Nature. Every big tree seemed to whisper to him "Hercules," and he felt quite at home. After the barber has removed sundry growth of a woody character, the Becker Mills Co. was able to recognize its successful salesman, and feels assured that he is in perfect condition to boost the Becker Mill products for the coming year.

WATER-WORKS MEN VISIT GLAUBER FACTORY.

Among the many points of interest visited in Cleveland by members of the Central States Water Works Association attending the fifteenth annual convention in that city Sept. 19, 20 and 21, 1911, none proved more enjoyable both from a social as well as educational point of view than the visit Wednesday afternoon, Sept. 20th, to the works of the Glauber Brass Mfg. Co., 4900 to 5100 Superior Ave. After a most interesting tour of inspection through the large plant, escorted by officials and representatives of the company who pointed out and explained the various stages of manufacture and rigid inspections through which their product passes, the members adjourned to the display room where an appetizing lunch had been prepared by the Glauber Co. Before departing, the members of the association expressed their great appreciation of the courtesy shown as well as the opportunity given them to visit this factory.

THE HONEYWELL GENERATOR IN ENGLAND.

The Honeywell Heating Specialty Co., Wabash, Ind., is introducing its heat regulator to all the crowned heads and cold feet on the European continent. The Honeywell representative has arranged for the manufacture of the generator by the firm of Chas. Winn & Co., Granville Lane, Birmingham, England. In a recent issue of the "Ironmonger," published in London, the following notice of the Honeywell products was inserted, which will be of general interest to our readers as presenting a European appreciation of its meritorious features: "The Honeywell generator is not unknown in this country, but it may be well just at this stage to recapitulate some

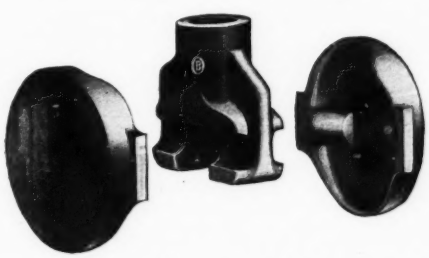
of its several points. Primarily its purpose is to make possible by accelerating the circulation and broadening the temperature range, the use of smaller pipes than is possible with ordinary low-pressure work, by augmenting the pressure from 0 to 10 lb. The Honeywell fitting, in a word, safely and automatically seals the whole apparatus by means of a double mercury column, thereby causing, according to the maker, the water to circulate through the system at a greater velocity than by the old-fashioned gravity-method. It is further claimed that by this method the pipes, radiator-valves and tappings may be materially reduced and the actual radiating-surface by an appreciable proportion."

THE UNDERTANK WATER-HEATER.

The Warren Water-Heater Co., Terre Haute, Ind., manufactures the "Undertank" water-heater, and since its introduction into the market has experienced considerable success in securing a number of installations throughout the country. The Warren Water-Heater Co. used to be in business in Minneapolis, but on the first of September moved its offices to Terre Haute, Ind., in order to be nearer its central market. The heaters are still being manufactured in Sheldon, Ia., which arrangement will continue until the spring, when the company intends to build a large factory at Terre Haute. The "Undertank" heater is not a combination heater, and can be used on old as well as new work, and in combination with the water-back, steam-coil, or fire-box coil, by removing the bottom connection from the opening in the heater and returning the hot-water into the side of the boiler. The sectional pipe used in the "Undertank" installation is quite ingenious, and its simplicity makes its attachment to any installation an easy operation, which should commend itself to all those interested in the heating business. Copy of the booklet illustrating and describing this device in detail can be obtained from the Warren Water-Heater Co., Terre Haute, Ind. When you write, mention "Domestic Engineering."

THE OHIO BRONZE GATE-VALVE.

The Ohio Brass Co., Mansfield, O., has recently developed a bronze gate-valve which is claimed to be the greatest advance in valve-construction offered to steam-engineers. All unnecessary and complicated parts have been eliminated, and its general appearance suggests simplicity and great strength. The valve-ports give unrestricted passage to the full capacity of the pipe. The body of the valve is globular, and the hexagons of the body are heavy enough to provide the required strength. The illustration shows the disc of the valve, which is of

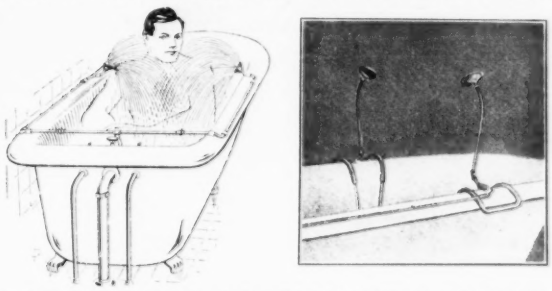


Disc for Ohio Gate-Valve.

the flexible or built-up type, compensating for any slight derangement of seat-angle due to pipe sagging, expansion or contraction of pipe-lines. Ribs cast in the body form vertical guides insure a perfect alignment with the valve-seat. They prevent in addition the finished faces of the device from coming in contact with the unfinished part of the valve-body. The clearance between the valve-gate and the bottom of the body is sufficient to prevent fouling against closure. The joint between the bonnet and the body is made outside the threads, protecting them from corrosive action. The complete description and illustration of the Ohio bronze gate-valve can be obtained upon application to the company. In writing mention "Domestic Engineering."

SANDHAM IMPROVED SHOWER-ATTACHMENT.

R. R. Sandham, Harlan, Ia., manufacturer of the Sandham shower attachment for bath-tubs, has improved the shower in a novel manner. The ordinary action of the shower is maintained by a semi-rigid frame of nickel-plated seamless brass pipe connected to the bath-supply by an aluminum faucet-connection and rubber-tube. The spray comes from nicket-plated spun brass spray roses at the end of the pipe-frame. The new device consists



The Sandham Shower Attachment and Spray Arm Extensions.

of a spray on extension, specially designed to meet the requirements of bathers who use bath-seats or stools in their tubs. As shown in the illustration, this extension provides that the water shall strike the bather in the same manner as though the regular Sandham shower attachment were used and the bather sat on the bottom of the tub. These extensions add but little to the cost of the shower. Full particulars can be obtained from R. R. Sandham, Harlan, Ia. In writing mention "Domestic Engineering."

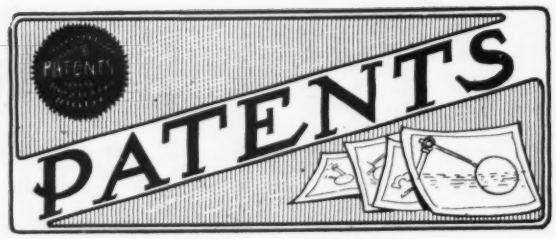
WATER-METERS.

"Fair and Square" and "American and New Niagara Water-Meters" are the titles of two new booklets which are being distributed at the present time by the Buffalo Meter Co., 290 Terrace, Buffalo, N. Y.

"American and New Niagara Water-Meters" is devoted to illustration and description of these well known types of water-meters. Their distinctive features are their disc mechanical movements, noiselessness in operation, positive action, and their construction of few and accessible parts The disc construction permits no open water-way through which water may pass without being registered, neither can the dics move and the meter register if water does not pass. This is distinctly contrary to the laws which govern the operation of the editorial gas-meter. Simplicity in water-meter construction is essential, because it is expected to run for years without attention. Furthermore, if repairs or cleaning should be necessary, they should be accomplished by local labor without recourse to experts. The booklet takes the water-meter to pieces before you and shows every feature of its construction.

"Fair and Square" is a deliberate attempt to increase the sale of water-meters by placing in the hands of all those interested—installers and consumers—the advantages of water-meter use. It is written in popular style and bristles with points like a porcupine. The plumber who reads this thoroughly, masters the arguments and digests their value, will be able to influence his municipal acquaintances to bring about the desired meter installation. The reading-matter overcomes successfully the arguments made against water-meter use and presents a number of interesting tables showing the advantages already attained by different cities throughout the United States. For instance, in Fall River, Mass., in 1874 there were 53 meters installed and a per capita consumption of 84.53 gal. per day. In 1908 the town posessed 7,961 meters and the per capita consumption daily was only 43.77 gal. "Fair and Square" is worth reading. You can get both booklets on application to the Buffalo Meter Co. Say you read about it in "Domestic Engineering."

C. Erwin Norman & Co., 29 W. Michigan St., Chicago, has just issued a booklet describing and illustrating the "Cenco" line of pipe-hangers, for the manufacture of which he has recently installed a complete manufacturing equipment.

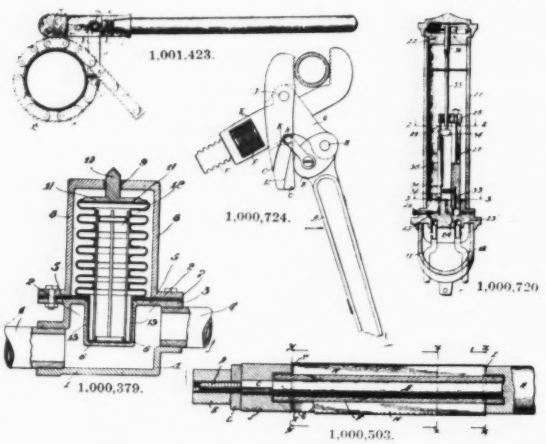


Heating Department.

1,000,379. Expansible Mechanism for Damper-Regulators. Edward J. Deegan, New York, N. Y. A device of the character described, comprising an expansible tube, a fluid-chamber with fluid-pipe reception means, a chamber projecting into said fluid-chamber substantially as set forth, and provided with a closed wall interposed between the fluid-chamber and the interior of the chamber projecting into the fluid-chamber, whereby it will be surrounded and acted upon by the fluid entering the fluid-chamber, a hollow extension projecting from the expansible tube and entering and fitting closely within the chamber projecting into the fluid-chamber, but removable therefrom as described, without opening the pipe or its chamber, and means connected with said expansible tube for operating a regulating device, all substantially as set forth.

1,000,503. Expansion-Reamer. Eugene Ferencik, West Allis, Wis. An expansion-reamer comprising the combination of a longitudinally channeled blade-holder, a set of blades mounted in the holder channels and projecting therefrom at their respective ends, a set of reversely threaded members having threaded engagement with the ends of the blades, and a spindle connected to rotate with said members; said blade holder being supported for independent rotation on the spindle.

1,000,720. Temperature-Regulating Device. Walter W. Curtis, Chicago, Ill., assignor to National Regulator Co., Chicago, Ill., a corporation of Illinois. The combination with a fluid-pressure motor, of a device for controlling the flow of fluid to and from said motor, said device having a chamber communicating with said motor and provided with an inlet communicating with a source of supply of fluid under pressure, said device having also an exhaust port leading from said chamber of greater capacity than said inlet, a valve within said chamber exposed to the pressure therein and arranged to close said exhaust port and to be held to its seat by said pressure,



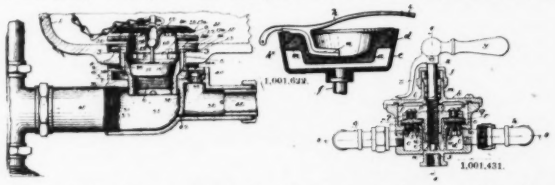
and an energy-storing device under tension, said device opposing the pressure in the chamber and tending to open said valve against said pressure, the tension of said device being varied by temperature changes.

1,000,724. Pipe-Wrench. William H. Duffey, South Betlehem, Pa. In a pipe-wrench, the combination with a handle having a cam head, of a lever jaw provided with a longitudinal slot and having its lower portion arranged in contact with said cam head, a jacket arranged in the slot of the said lever jaw and having portions pivotally connected with the said lever jaw and with the cam head of the handle, the said jacket being always inclined with respect to the axis of said lever jaw, a threaded jaw having a shank constructed to pass movably through the said jacket, and a nut constructed and arranged to act upon the said threaded jaw and upon the jacket to adjust the said threaded jaw.

1,001,423. Pipe-Wrench. Patrick Jos. McGuire, New York, N. Y. In a pipe-wrench, a lever, a removable head on said lever, a yoke pivoted to said head and adapted to swing on either side of the same, flexible gripping means pivoted to said yoke, teeth on opposite sides of said gripping means and adapted to pass about an article to be gripped and back through said yoke, and teeth on opposite sides of said head engaging the teeth on said gripping means, whereby a leverage is produced by said head engaging said gripping means, and whereby the teeth on one side of said flexible gripping means will be in engagement with the article to be gripped, and teeth on the opposite side of said flexible ripping means will be in engagement with one set of teeth on said head.

Plumbing Department.

1,001,122. Supply and Waste for Bath-Tubs. Dennis C. Charmois, Canton, Ohio. A supply and waste for a bath-tub or the like including a waste-pipe with a flange thereon and having supply apertures in the flange, and a loosely fitting collar adapted to move endwise in the



pipe and having a flange on its upper end normally closing the pipe-flange apertures, there being a depending inclined rib on the rim of the collar flange serving to deflect the supply downward.

1,001,622. Manufacture of Lavatories and the Like. Raymond E. Crane, Cameron, W. Va. The method of making the slab and apron of an earthenware lavatory or the like, which consists in molding said slab and apron from the clay as a homogeneous unit, by spinning the clay under a forming tool during the molding operation, such operation being carried on in a mold of such shape and under such conditions that in shrinking the apron will rise in the mold, permitting the slab and apron to remain in the mold until shrinkage has taken place and consequently the circumference of the slab is drawn slightly toward the center of the basin, and finally firing the article to constitute the final product, substantially as described.

1,001,431. Mixing-Valve. Edward F. Niedecken, Milwaukee, Wis. In a mixing-valve the combination of a case having inlet chambers and a mixing and outlet chamber connected with the inlet chambers by ports, valve-discs adapted to close said ports and provided with plugs fitting into the ports and having reversely tapered peripheral openings, and means for moving said valve disks and plugs axially with relation to the ports which they control.

1,000,367. Water-Heater. Charles A. Borein, Oakland, Cal. A water-heater, a boiler having its bottom set above the lower edge of the shell thereof, a vent-tube extending between the said bottom and the top of the boiler, a circulation-tube inclosing said vent-tube and extending from near the bottom to near the top of said boiler, an annular space being formed between said circulation-tube and said vent-tube; a heating mechanism connected to the bottom of the boiler, and having a discharge-pipe connected to the top of the boiler, said discharge-pipe having lateral branches leading into the space between the said vent-tube and the said circulation-tube; and a suitable burner.

1,000,382. Vacuum-Cleaning Machine. Ora Drake, Cleveland, O. A vacuum-cleaner comprising a shoe having substantially V shaped portions from its middle to its ends and provided with a slot centrally in its bottom and an opening in its top, in combination with suction means adapted to draw the dust through said shoe.

OHIO STATE UNIVERSITY

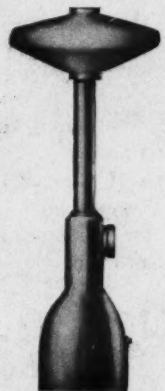
DOMESTIC ENGINEERING

Volume 56 | MAIN OFFICE 443 S. Dearborn St., Chicago | SEPTEMBER 30, 1911 | EASTERN OFFICE 150 Nassau St., New York | Number 14

Why Have More Than

55,000

Honeywell Systems of Hot Water Heating Been Installed Since 1896?



HONEYWELL HEAT GENERATOR

Because Honeywell Hot Water Heating is more efficient, more economical, more sightly and more dependable and costs less than old-style, large pipe, water-logged hot water.

DO YOU USE THE HONEYWELL METHOD?

Are you still in doubt and continue to pay high wages for labor to work large piping, to say nothing of the extra cost of the materials? If you are doing this and want to learn a better and cheaper way, write us. Without expense or any risk on your part, we will show you how to install a Honeywell plant that will be unconditionally guaranteed by us and we will assure you that it will cost you at least ten per cent less than old style hot water.

You can prove the worth of the Honeywell Heat Generator—the heart of the Honeywell System—by attaching one to some existing large pipe, unsatisfactory job that you may know of, and for such a job we will furnish a Generator on trial.

OUR PROPOSITION

Attach a Honeywell Heat Generator of suitable size and in a manner described by us, to the expansion pipe of any large pipe hot water job and try it out for thirty days. If at the expiration of this period you or the owner are not entirely satisfied with the results, the Generator may be disconnected and returned to us and we will cheerfully and promptly allow credit in full, pay the fitter $3.00 for his trouble and bear all return charges.

Of the 55,000 Honeywell Heat Generators in use, approximately fifteen per cent of this number have been used in correcting old, unsatisfactory jobs under the above proposition. Your address will bring full details.

THE HONEYWELL "UNIQUE" HOT WATER RADIATOR VALVE

THE HONEYWELL HEATING SPECIALTY CO.
WABASH, INDIANA

We manufacture and sell 125,000 (one hundred and twenty-five thousand)

4 1-2 Fuller Bath Cocks

per annum, for the wholesale trade only. You lose, if you don't inquire.

Northern Brass Manufacturing Company
WAUKEGAN :: :: :: :: ILLINOIS

This Valve Can Be Used

in connection with any Vacuum, Drip Pipe or Air Line System.

The Automatic Heating Co., owners of the Paul System, say that our "Telwen" Valve is a decided advance over any they have heretofore used.

Special circular on application.

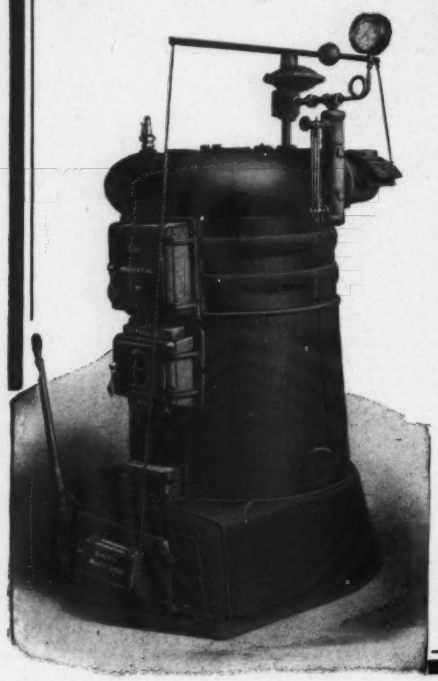
MONASH-YOUNKER CO.
New York Chicago

An Additional Guarantee is Given on your work every time you install a Mueller Water Strainer. See page 4.

MUELLER

INDEX TO CONTENTS PAGE 19 | BUYER'S DIRECTORY PAGES 66 68, 70, 72 and 74 | INDEX TO ADVERTISERS PAGE 64

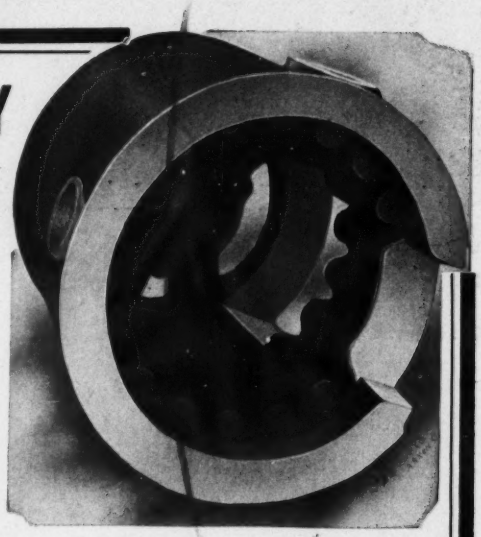
THE QUESTION OF DELIVERY



Is completely answered by the Prudential Steam and Hot-Water Boilers.

Prudential Boilers in operation exceed their ratings.

A long and correct fire-travel gives evaporative efficiency and quick transmission of heat.



YOU CAN GUARANTEE

to your customer perfect service with greatest fuel economy.

The most profitable boiler to sell and install is the one that will cut your customer's fuel-bill.

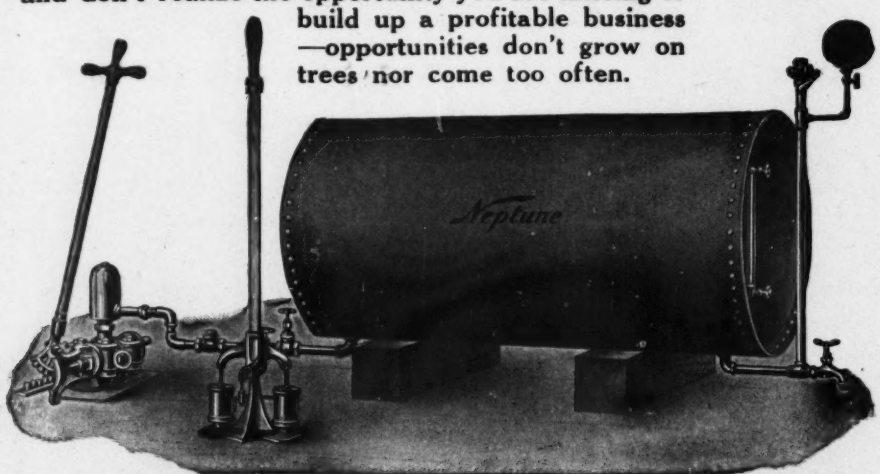
Note the easily-cleaned fire-surfaces. You know what that means. Write for Catalog and Quotations to the

PRUDENTIAL HEATING CO.

AKRON, ∴ ∴ ∴ OHIO

SPECIAL EXTRA

Get the story of Neptune Water Supply Systems. If interested write for it today—if not you should be and don't realize the opportunity you are missing to build up a profitable business—opportunities don't grow on trees nor come too often.



ONE OF OUR MANY OUTFITS for supplying sparkling fresh water to any house under any pressure desired. We will design a system to suit any requirements.

FLECK BROS. CO.

House of Quality **PHILADELPHIA, PENN.**

Kindly quote "Domestic Engineering" in writing advertisers.

"Herbert" PATENT DETACHABLE FIREBOX BOILER

"The Wonder of the Age"

AGENTS WANTED—to promote its sale in territory where we are not represented.

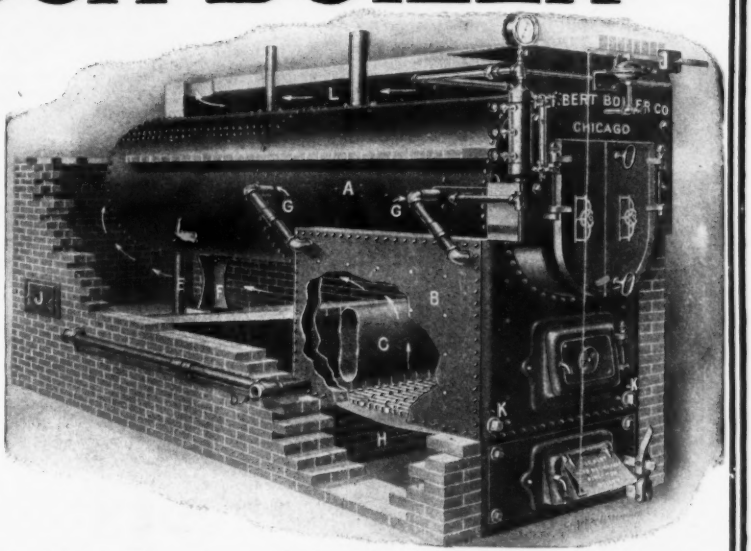
"The picture tells the story"—you don't have to be a mechanical Engineer.

Nor need you know much of B. t. u. . . any reliable, progressive heating contractor can sell the Herbert Detachable Firebox Boiler to any man who is building for investment. Its economy, durability and efficiency is apparent.

Are you seeking to better your condition and secure a larger profit?

Then write for our exclusive Agency proposition before some smarter man in your town beats you to it.

The wires are singing! Get Busy!
TODAY IS NOT TOO LATE.



HERBERT BOILER CO., Root and La Salle Sts., Chicago

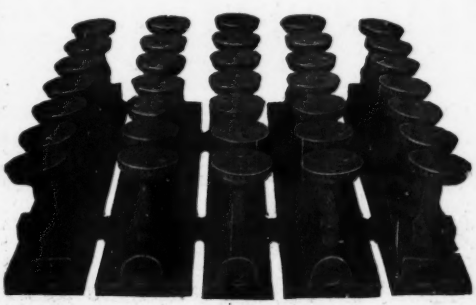
Gurney HEATERS

Hot Water and Steam

Are the product of fifty years' experience in the manufacture of steam and hot water heating boilers. They embody every improvement of value, are constructed from highest grade irons, by skilled workmen, and their use will give both the contractor and user the greatest satisfaction. We sell only through the trade. Be sure you have our catalogue and quotations.

GURNEY HEATER MFG. CO.

12 East 42nd Street, NEW YORK **Corner Franklin and Pearl Streets, BOSTON**



"Standard Gas Saving" Burners

Applied to Steam Heating Boilers, Hot-Water Heating Boilers and Hot-Air Furnaces

Make Heat Quicker and Hotter than anything.

ARE MOST ECONOMICAL

Manufactured by us for past ten years

STANDARD HEATING & RADIATOR CO.

Gas Burner Manufacturers

218 Penn Ave. **Pittsburg, Pa.**

Here's a Good Seller

Every article of merit you can carry as a side-line will greatly increase your profits without any additional expense.

This Sanitary Cuspidor

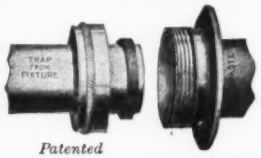
will sell readily among hotels, restaurants, offices, buffets, banks, etc., because of its special foot-flushing device and its many other distinguishing features.

Send for a full description and our special offer.

McDERMONT & MORY
25 W. 2nd Street :: DAYTON, O.

The Stewart Waste Pipe Couplings

for connecting traps or wastes from fixtures to lead waste pipes, without wiped or solder joints. This makes absolutely the best connections.



Patented

Made in the following sizes:

1¼" for 1¼" brass trap or waste connect to 1¼" lead waste.

1⅜" for 1⅜" brass bath overflow connect to 1¼" lead waste.

1½" for 1½" brass trap or waste or bath overflow connect to 1½" lead waste.

For Sale by all Jobbers

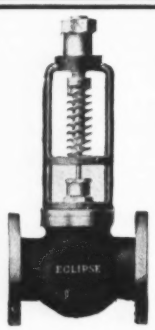
Stewart Mfg. Co.
10708 Orville Avenue :: Cleveland, Ohio

Shirley Radiator & Foundry Co.,
Shirley, :: Ind.

A Complete Catalog of Plumbers' Specialties

Chains, Eight Hooks, Split Links, Jack Chains, Tank Pulls, Pipe Straps, etc., are fully described in our latest catalog. A copy is free to you. Upon request to

The Smith & Egge Mfg. Co.
Bridgeport, Conn.



ECLIPSE SPRING REGULATED PUMP REGULATORS

are more efficient in every way where it is necessary to maintain a constant pressure than regulators controlled by weight and lever.

REPRESENTATIVES

W. G. Ruggles Co., 45 High St., Boston; Jas. H. Pearson, 122 Centre St., New York; Jas. F. Marshall, 608 Chestnut St., Phila.; Geo. T. Ladd Co., 1620 Farmers' Bank Bldg., Pittsburgh; Western Valve Co., St. Louis, Mo.; Theo. F. Dredge, Monadnock Bldg., San Francisco; J. A. Roe Co., Detroit; Hunter B. Frischkorn, Richmond, Va.

HUGHSON STEAM SPECIALTY CO.
Successor in the Manufacture of the Eclipse Steam Specialties of the John Davis Co.
5021-23 State Street :: CHICAGO

Catalog of detailed information covering our complete line on request

TIGHT JOINTS

in water, gas, steam or air piping that will stay tight and never set are certain if you use

ELASKO

Pipe Joint Cement. Makes a perfect joint. Send for free sample today.

Stearns Radiator Truck pays for itself on first job—saves time and labor. Send for free circular.

F. M. Stearns & Co.
Jamestown, N. Y.

ALL PLUMBERS AND FITTERS HAVE VISES

But All of Them have not found out that the Parker Combination Vise is the best on the market. Six sizes, and every one O. K. Sold by all jobbers.

Chas. Parker Co.
FACTORIES:
Meriden, Conn.
NEW YORK SALES ROOMS,
32 Warren Street

THE FROST MFG. CO.

Closet Fittings
"Femco" Traps
"Femco" Bath Wastes

KENOSHA, WIS.

THE

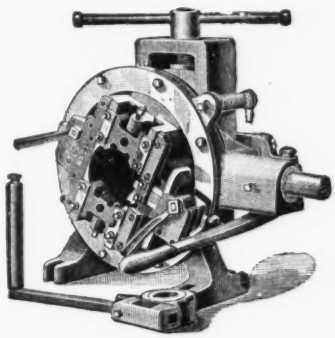
ARMSTRONG MANUFACTURING CO.

284 Knowlton St., BRIDGEPORT, CONN.

NEW YORK OFFICE: 248 Canal Street CHICAGO OFFICE: 171 N. Jefferson Street

Genuine Armstrong Stocks and Dies

PIPE MACHINES
FOR CUTTING OFF
AND THREADING PIPE
OR BOLTS
Hand or Power

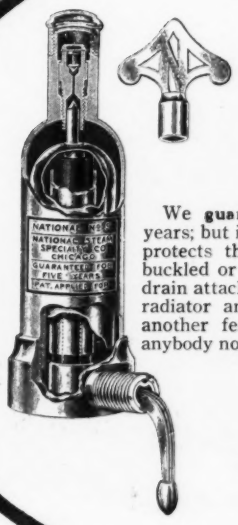


HINGED PIPE VISES
BARD ADJUSTABLE
BUSHINGS
NIPPLE HOLDERS
RATCHET ATTACHMENTS
PIPE CUTTERS

CATALOGUE Mailed on Request

NATIONAL VALVES

ARE GOOD



The easiest way to **assure yourself** of valve efficiency is to specifiy, use and sell **National** Valves. The **National** line is **complete** and embraces all kinds of Automatic Air Valves. Write for prices—and a special folder describing the National Improved Thermostatic Valve.

No. 9 Vacuum Valve

We **guarantee** good service from this valve for five years; but it will last longer than that! A brass tubing protects the composition and prevents it from getting buckled or bent from over adjustment. An automatic drain attachment drains every drop of water back into radiator and prevents "spitting". The lock-shield—another feature—prevents it from being adjusted by anybody not in possession of the key.

No. 8 Vacuum Valve

Has brass-encased composition and the lock-shield feature. In addition, this valve will discharge all air from radiator and prevents any from being drawn back. Write for illustrated folder.

National Steam Specialty Co.

See Sweet's Index Pages 989, 990, 991

8-10 S. Clinton Street
CHICAGO

SURPLESS, DUNN CO.
74 Murray St., New York.

An Additional Guarantee of Your Work

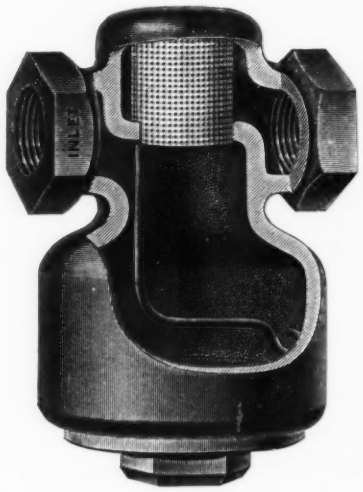
Every time you install a Mueller Water Strainer you are giving an additional Guarantee of a lasting and serviceable job.

The Mueller Water Strainer, an inexpensive addition to a good job, intercepts all scale, grit, sand and shells, preventing their obstructing the pipes or reaching and cutting out valve seats.

It is the most satisfactory strainer on the market, simple in construction and easily cleaned.

Unconditionally guaranteed.

MUELLER WATER STRAINER



TRADE MARK
MUELLER
REGISTERED

H. MUELLER MFG. CO.

Works and General Offices
DECATUR, ILL., U. S. A.
West Cerro Gordo St.

Eastern Division
NEW YORK, N. Y., U. S. A.
254 Canal St., cor. Lafayette

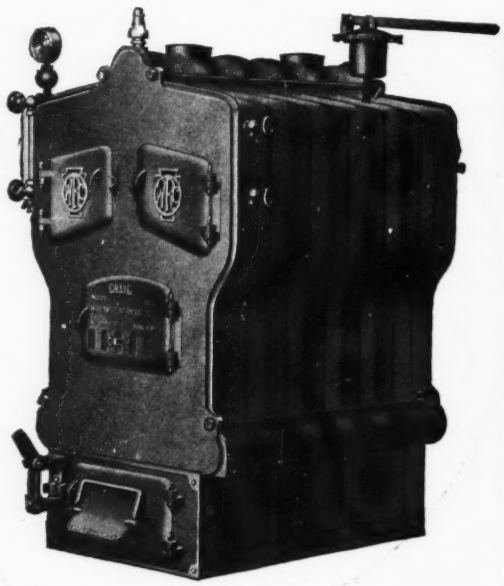
The Williamsport Line

The cut shown herewith illustrates our new 22-inch **Push Nipple Boiler,** with ratings of 600 feet to 1400 feet steam and 1000 feet to 2400 feet hot water. For lower capacities there is our 15-inch **Push Nipple Boiler.**

We also manufacture the well known line of **Craig Screw Nipple Boilers** in all capacities.

Ask us for new Catalogue and discounts to the trade.

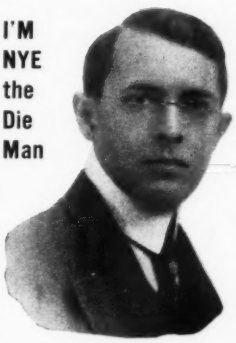
Architects—See Sweet's Index.



No. 226 Steam Boiler

Williamsport Radiator Company
WILLIAMSPORT, PA.

99 Beekman St., NEW YORK
1415 Commonwealth Bldg., PHILADELPHIA, PA.

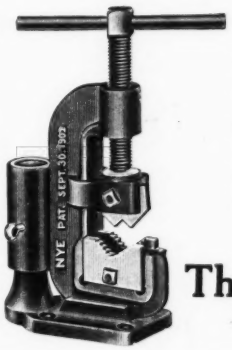


You'll Only Be Out a Penny

—if you send for the LITTLE WONDER VISE and find, after giving it a fair trial, that you don't like it. For the next 60 days I'm going to send this vise to anyone who wishes to try it, charges prepaid.

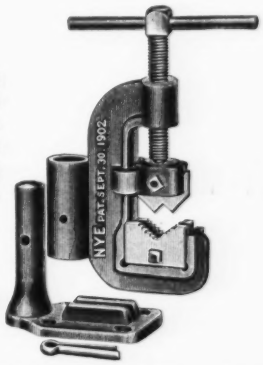
Further than this, I'm going to stand the charges for shipment back, in case you are dissatisfied

Did you ever hear of a fairer, squarer offer? I'm going myself one better than I ever have before. The "FREE TRIAL" offer applies to all Nye Tools. On request any of them are and always have been shipped F. O. B. Chicago.



But This Is An Exceptional Offer

I'm going to send this vise to those who mail me a postal asking for it on free trial and go down in my jeans for the freight both ways in case they don't like the tool. Holds pipe from ⅛ to 1 inch. By the removal of a cotter pin the vise part can be removed from the base and carried in a coat pocket. It is held on the job by slipping a length of ½ inch pipe through the hollow sleeve on the back. **Price $2 each, net.**



NYE, THE DIE MAN

The Nye Tool & Machine Works

114 N. Jefferson Street, Chicago, Ill.

The Mechanical Rubber Co

The Nagrom Tank Ball is a Necessity to Good Plumbing

'The whole is as strong as its weakest point', and if a poor tank ball is used, there is a weak point in your plumbing system.

The "NAGROM" is the only molded Tank Ball on the market. It is made of natural gray rubber, and will neither swell nor crack.

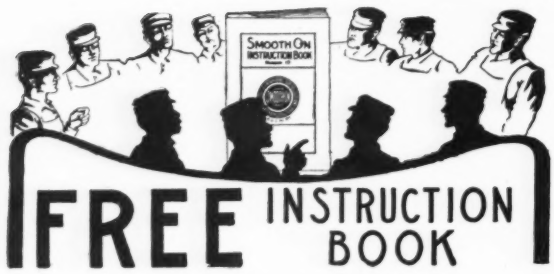
Formerly manufactured by Morgan & Wright.

Now, together with all other Plumbers' Specialties by

The Mechanical Rubber Co.

Cleveland, Ohio, U. S. A.

Kindly quote "Domestic Engineering" in writing advertisers.



FREE INSTRUCTION BOOK

SEND FOR IT TODAY

This book should be within instant reach of every engineer. It tells clearly, by photograph and formula, how to use the well-known Smooth-On Iron Cements in repairing boilers, engines, castings, tanks, joints, etc.

Used according to instructions, Smooth-On Cements will save more actual time and money in the engine and boiler room than any single product manufactured. Their uses are innumerable, and their repairs absolutely permanent.

SMOOTH-ON MFG. CO.
572-574 Communipaw Ave.
Jersey City, N. J.

CHICAGO - - 231 N. Jefferson St.
SAN FRANCISCO - 94 Market St.

John Simmons Co.
104-110 CENTRE STREET : : NEW YORK, N. Y.

Wrought and Cast Iron
PIPE

Malleable and Cast Iron
FITTINGS

Brass and Iron—Globe and Gate
VALVES

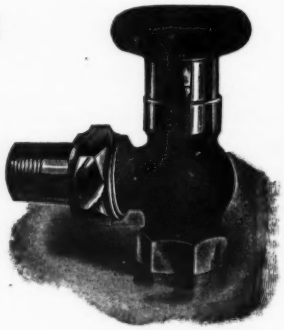
Tools and Specialties for
STEAM PLUMBING GAS AND HYDRAULIC
ENGINEERING

ATMOSPHERIC SYSTEM OF STEAM HEATING

is based on the correct principle. Steam is supplied in vapor form from the ordinary house boiler or from the central station.

Actual practice has demonstrated this system will save from 25 to 40 per cent in fuel bills. Furthermore it is easier to control and maintain, and is the ideal system for use in residences, public buildings churches, office buildings, schools, etc.

Naturally you are interested so write for catalog No. 119 giving full information. Estimates furnished.



"ADSCO" Graduated Radiator Valve

Our "ADSCO" valves are graduated to supply any given amount of radiation and may be regulated to suit weather conditions.

American District Steam Co.
Lockport, N. Y. North Tonawanda, N. Y. Chicago

TRIMO TOOLS Are Universally Commended

SUCCESS IS ITS OWN RECOMMENDATION

What has been accomplished by the
TRIMO PIPE WRENCH
is fast being achieved by the
TRIMO PIPE CUTTER
Send for Catalog No. 42

The name TRIMO will be found on every TRIMO Tool

Drop Forged Frame. All parts interchangeable. Convertible from a one to a three wheel cutter by simply removing and substituting wheels.

Made by **Trimont Manufacturing Company,** ROXBURY, MASS. (BOSTON)

The prize dog at a bench show wins on points ;
and points would give the COCHRAN first prize at a **wrench** show.

Here are the points. You be the judge.

Frame and handle one solid piece. Indestructible rocker in place of frame pin. No crushing or locking.

No lost motion.
Perfect grip and release.
Proof against all side-pull injury.
Drop forged jaws of highest grade tool steel adaptable to wrench manufacture.

COCHRAN PIPE WRENCH MANUFACTURING CO.
7800 Woodlawn Ave., Chicago, Ill.

THE TWO IN ONE WRENCH
With Half Link Adjustment

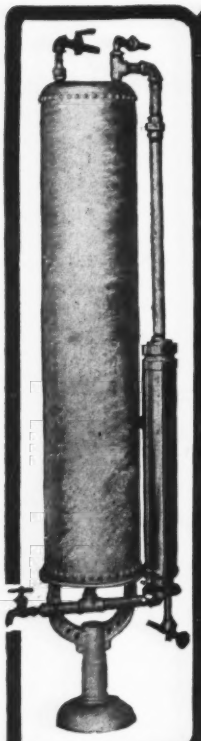
Permits use on any pipe fitting made. Thequickest adjusting wrench on the market. Will do the work of any two chain wrenches.

The Brock Standard
may *look* like others, but try one and
see the difference. Where do you live—let us know.

THE BROCK WRENCH MFG. CO., 18 Dey St., New York

DAYTON WATER SYSTEMS

MANUFACTURED BY THE DAYTON PUMP & MFG. CO. DAYTON, O.



EUREKA
Water Jacketed GAS HEATER

Most Economical, Safe, Reliable and Durable.

Very Attractive

All Brass Nickel-Plated.
Has a Sediment-Chamber and Flush-Valve.
No Clogging of Heating-Coils.
Consumes Only One-Third as much Gas as any other Heater

Requires No Floor Stand.

Built in Sizes to Meet Every Requirement of Heating Water by Gas.

Write for descriptive matter

Eureka Water Heater Co.
37 W. Lake St., Dept. D, CHICAGO
215 Columbia St., Dept. E, Seattle, Wash.

The Best Floor Drain on Earth
THE BLAKE

JUNIOR NO BACK FLOOR DRAIN

This is a broad statement to make, but, we have no hesitation in doing so, and, if you will examine the cut, it will convince you of our claim.

Has a sand arrester to prevent mud and sand from washing in trap. Easy to clean — cover not bolted. Cleanout plug for access to sewer. It has spun copper ball and rubber seat, which makes it a perfect back-water floor drain. Made in 2-inch, 3-inch and 4-inch sizes.

2-inch measures 10 by 10 inches and 9 inches deep.
3-inch measures 12 by 12 inches and 12 1-2 inches deep.
4-inch measures 17 by 17 inches and 16 inches deep.
2-inch weighs 25 lbs. 3-inch weighs 50 lbs. 4-inch weighs 85 lbs

We manufacture Clean-outs, Iron, Lead and Brass Traps fitted with Blake's famous "So-easy-to-remove-clean-out cover and soil pipe fittings".

SEND FOR CATALOGUE

BLAKE SPECIALTY CO.
2412 3rd Ave., ROCK ISLAND, ILL.

The Government is Installing American Closet Combinations

—they are pretty good judges of good things.

The outfit is the finest and best in the whole world—tank reinforced cast iron, white enameled same as inside of bath tub. Very fine. Will last for ages.

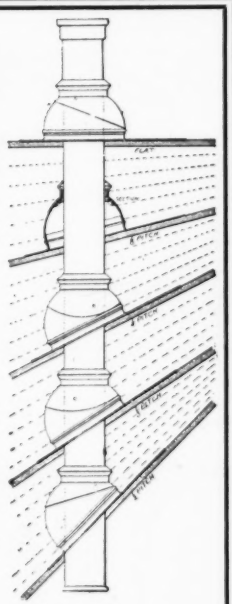
No machinery in tank —just water and air.

Nothing to the valve but two pieces; never gets out of order; saves one-third water.

Now is the time to get in on the ground floor. Better write us for prices and particulars.

AMERICAN VALVE CO.
INDIANAPOLIS, IND.

The Bullard Roof Flange



Adjustable to all pitches.
Easily attached.
Rust proof and non-leakable.
Made of galvanized iron or copper.
Always ready to be installed.
The best flange made.

Send for Booklet

BULLARD SPECIALTY CO.
P. O. Box No. 345
TIFFIN, OHIO

If you wish to insure yourself and client against annoyance be sure the Range Boilers you purchase bear this label:

Electric Weld

NEW STYLE BOILER

THIS boiler is offered after three years' exhaustive experiment and test.

We recommend this type as superior to the riveted Seam Boiler or the "Electric-Weld" Boiler with riveted head and bottom.

By this process of construction, defects are practically eliminated.

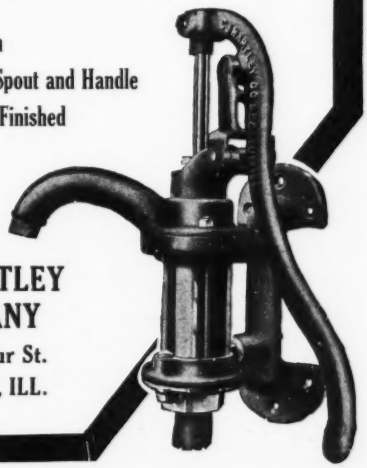
This boiler will withstand all necessary handling in transit, and will give results not possible with a boiler made up with rivets.

John Wood Manufacturing Co.
CONSHOHOCKEN, PA.

The Famous HARTLEY Fig. 451 PUMP

has attained it celebrity in the short space of three years. No one wants an old fashioned kitchen pump now, because modern convenience is better than old-style awkwardness.

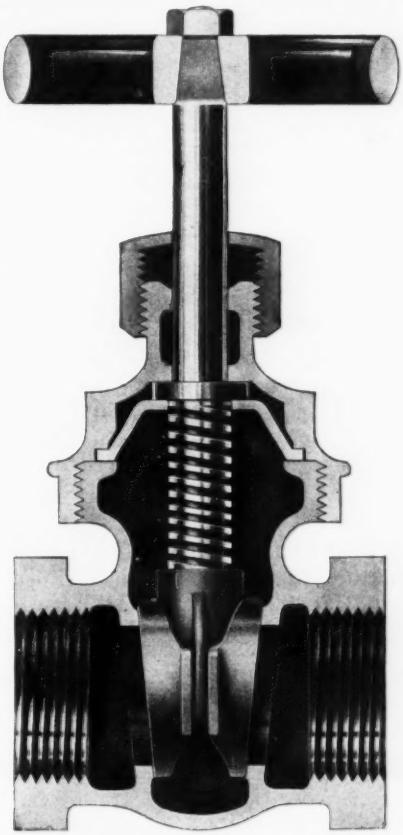
No plattorm
Adjustable Spout and Handle
Beautifully Finished



Write today

C. J. HARTLEY COMPANY
East Decatur St.
DECATUR, ILL.

The Jobber's Line



Sectional View of Ohio Gate Valve—Patent Pending

We have just placed upon the market an "up-to-the-minute" line of Bronze Gate Valves, developed through the co-operation and liberal support of Jobbers over the entire country. It is, in fact, the Jobber's own line and is second to none on the market.

We want you to have a chance to know the many distinctive advantages of this line before you order a new stock.

Samples Prove It

Fully Described in New Catalog KD.

The Ohio Brass Co.

Mansfield, Ohio, U. S. A.

New York Chicago San Francisco

"Wells" Snaplock Steel

Adjustable Floor and Ceiling Plate

Size ½" to 2"

FLOOR AND CEILING PLATES

TRADE MARK

Sold by all first-class jobbers

No. 7

Combination Floor and Ceiling Plate

Sizes ⅜" to 3"

Manufactured by

The Beaton & Corbin Mfg. Co.

SOUTHINGTON, CONNECTICUT

N. Y. Office. 210 Water St.

2"-2½"-2¾"

CHICAGO TANK BALLS

HARD TOP *Write us* SOFT BOTTOM

We Can Ship Promptly

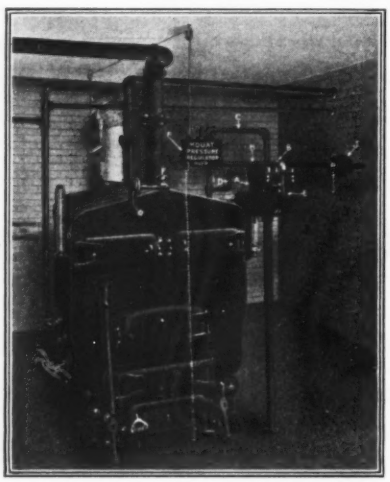
Made by THE MECHANICAL RUBBER CO., 307 W. Randolph St. Chicago

Chicago Rubber Works

THE MOUAT VAPOR HEATING SYSTEM

(PATENTED)

Simple



Economical

The main feature of the MOUAT Vapor Heating System is the ability to control the heat to suit weather conditions. Each radiator is equipped with a fractional valve and may be **kept partially** or entirely heated as required.

WRITE FOR OUR PROPOSITION

MOUAT VAPOR HEATING CO.

1246-54 W. 4th St., Cleveland, O.

The Hanna "Ball Joint" Pipe Hanger

SIMPLEST

No. 1.

STRONGEST

The only thoroughly reliable hanger on the market. **Neat, Symmetrical.** Guaranteed to be the strongest hanger made. The ball and socket joint allows hanger to swing in any direction. Pipe may be lowered or raised without removing hanger. No loose parts to drop off or get lost.

We also make "Penn" and "Ball Joint" Steam and Water Specialties

Write for our "Silent Salesman"

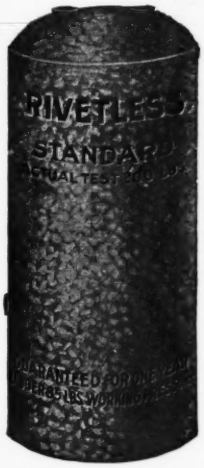
The Penn Engineering Co.

Philadelphia, Pa.

Here It Is!

The Ideal Range Boiler

For almost three years we have been trying out these boilers in every part of the United States and under every possible condition. The results have far surpassed our most hopeful expectations.



Our Rivetless Boilers are oxy-acetylene welded and brazed; the shell, head and bottom joints have the full strength of the material.

A Boiler with **ANY** seam riveted loses about 50% of the strength of the material.

No rivet holes to weaken the seams or allow the water to leak through.

Rough handling and knocks in transit, while ruinous to riveted boilers, have very little effect on our Rivetless Boilers.

Made in Standard, Extra Heavy and and Double Extra Heavy grades.

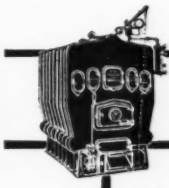
Beware of Imitations

Insist upon your Jobber furnishing **SCAIFE** Rivetless Boilers if you want the best.

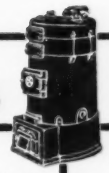
We also manufacture Scaife Brazed and Riveted Range Boilers, Steel Storage Tanks, Pneumatic Water Supply Tanks, Hot Water Expansion Tanks, Closet Tanks, Gasoline Tanks, Etc.

WM. B. SCAIFE & SONS CO.

Founded 1802 PITTSBURGH, PA.



The Burnham



IN ORDER to cut down the expense of manufacturing, most boiler concerns make one boiler answer for both water and steam, by simply changing the "trimmings."

As a result there is too little space at the top of the boiler for the steam to expand in, when used for steam; and too large a volume of water to heat and circulate rapidly, when used for water.

The steam you get is lifeless. Or the water in the pipes is sluggish, and requires forcing of the boiler to get the returns you want.

But **not so with The Burnham.**

There is a **difference of six inches between the height of the 24-inch Water and Steam Boilers.**

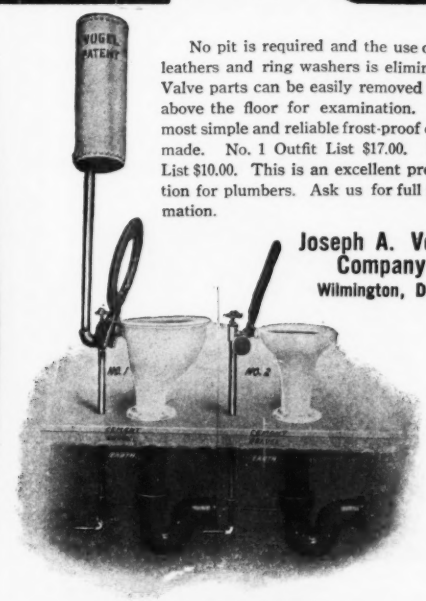
It's a difference that affects the coal bill.

Send for catalog.

Lord & Burnham Company
IRVINGTON, NEW YORK

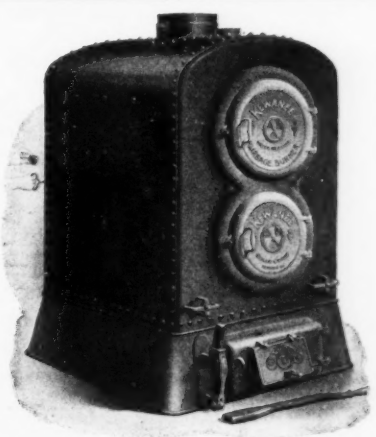
Boston	Tremont Bldg.
Providence	Allen & Reed, Inc.
Philadelphia	Haynes-Thompson Co.
Chicago	Davies Supply Co.
Minneapolis	Roberts-Hamilton Co.
Johnstown, Pa.	Union Radiator Co.

VOGEL *Patent* Frost-Proof Closet



No pit is required and the use of cup leathers and ring washers is eliminated. Valve parts can be easily removed from above the floor for examination. The most simple and reliable frost-proof closet made. No. 1 Outfit List $17.00. No. 2 List $10.00. This is an excellent proposition for plumbers. Ask us for full information.

Joseph A. Vogel Company
Wilmington, Del.



KEWANEE WATER HEATING GARBAGE BURNER

For Destroying Refuse Without Odor

Burns ALL the Garbage
Destroys ALL the Odor
Heats ALL the Water
you can use.

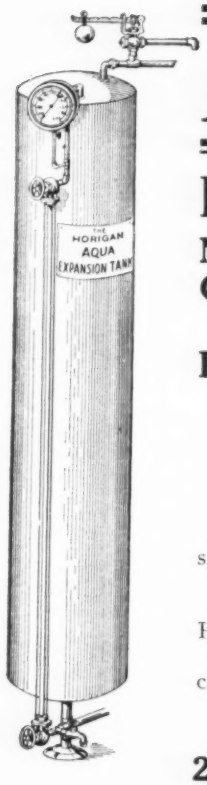
PATENTED
Send for catalog No. 59

KEWANEE BOILER COMPANY

KEWANEE, ILLINOIS

Chicago St. Louis New York Kansas City Salt Lake City

Kindly quote "Domestic Engineering" in writing advertisers.



The Horigan Aqua Expansion Tank

For Hot Water Heating

Makes Hot Water Heating Cost Less Than Hot Air

Price Complete $11.50

The very best thing ever offered

FOR HOT WATER JOBS

Nothing like it before.

Saves 25% in Fuel Bills.

Saves 25% in Radiation.

Reduces size of pipe and fittings 50%.

Reduces cost of material and labor 50%.

Gives 50% better results than any other system.

Does away with the old-style tank in attic.

Does away with all Heat Generators and High-Priced Valves.

Cures an old job that is sluggish and increases the circulation 50%.

Is placed alongside of boiler in basement, and saves extra expense of running pipe to top of house in placing tank.

All air is taken out of the radiators through the air valves in the ordinary way.

¾ inch risers to 1st floor.

½ inch risers to 2nd floor and above.

All jobs the same, only change being in the size of main.

No main larger than two inch is necessary.

Easy—ain't it? Write for descriptive matter.

HORIGAN SUPPLY COMPANY

220 South Fourth St. St. Joseph, Missouri

A795
TONSOR BARBER LAVATORY

The name **"KOHLER"** is the greatest assurance of Enameled ware value, whether the consideration be sanitary efficiency, beauty of design, quality of material used or correct mechanical construction.

To specify **"KOHLER'S-SUPERIOR"** ware is to protect against subsequent trouble and expense arising from the numerous imperfections found in inferior ware. It is the line that insures a profit and builds up a reputation.

Look for the **MAROON** and **GOLD** label. **It is a Guarantee of Quality.**

"A GUARANTEE OF QUALITY" TRADE MARK

J. M. KOHLER SONS CO.
SHEBOYGAN, WIS., U. S. A.

Producers of
"KOHLER'S-SUPERIOR" Porcelain Enameled Iron Sanitary Ware.

BRANCHES:

NEW YORK 47 West 42nd St.
CHICAGO 514 1st Nat'l. Bank Bldg.
SAN FRANCISCO 1001-1099 Monadnock Bldg.

Our New Booklet **EXPULSO** TRADE MARK

List Price, $10.00

Tells you how the **EXPULSO** does the work of the siphon jet—*does it quicker and better.*

It's all in the Groove

A curved channel or groove, directs the flushing water into the suction leg, and siphon action is started and sustained by means peculiar to the **EXPULSO** and **never before employed.**

The EXPULSO Bowl

HAS
- Large Water area (9" x 12").
- Deep Seal (3").

WILL
- Discharge Bowl contents in 3 seconds.
- "Hold down" while flushing.
- Pass 2½" ball freely.

The Great Western Pottery Company

TIFFIN, OHIO KOKOMO, IND.

Manufacturers of Vitreous China Lavatories and Special Closets of all kinds.
Write for Catalog.

Foster Valves

"Reliability Their Main Feature"

Once learn the utility and construction of any one of the Foster Valve Specialties and you will add another to those who are installing these devices.

For pressure regulation in steam heating service

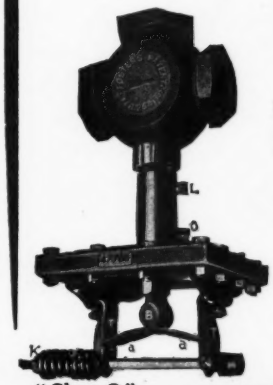
Class Q and QH Valves

are extensively used in connection with low pressure heating systems.

Class Q is for one to fifteen pounds delivery pressure general service.

Class QH Valve is for the same service as Class Q but is made with enlarged outlet connection for employment where a smaller valve than full size of delivery pipe can be used.

We build High Pressure Regulators, Back Pressure Valves, Blower Valves, Free Exhaust Valves, Automatic Non-Return Stop Valves, Emergency Valves, Class U. Regulator, Excess Boiler Feed Pump Governor, etc.



"Class Q"

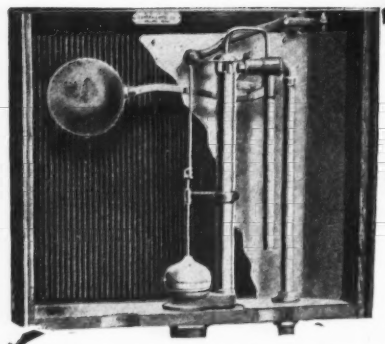
Foster Engineering Co.

NEWARK, N. Y.

Room 520, 180 N. Dearborn St., CHICAGO, Ill.
161 Summer St., BOSTON, MASS.
914 Farmers' Bank Bldg, PITTSBURG, PA.
601 Harrison Bldg., PHILADELPHIA, PA.

"Class QH" Valve

Kindly quote "Domestic Engineering" in writing advertisers.



Two Ways to Tell a "Superior Quality" Closet Tank

First: By its **superior quality.**
Second: By the trade mark "Superior Quality" which is stamped upon it.
In both ways it differs from just ordinary tanks.
"Superior Quality" Closet tanks are made of *one solid piece of bent wood.*
And are lined with a *patented corrugated air-cell sub-lining* in addition to tinned copper-lining. Preventing Chemical or Corrosive action on the metal lining.

CENTRAL CLOSET MFG. COMPANY
KOKOMO, INDIANA

Outdoor Pipes

High Pressure Work Pipes in Damp Places, Etc., are perfectly protected by

"Diamond N" Ideal Covering

Lined with regular Asbestos-Magnesia composition, with half-inch jacket of wood felt; it is covered with canvas. We make coverings especially for every requirement.

Write us for estimates.

NORRISTOWN MAGNESIA & ASBESTOS CO.
NORRISTOWN, PA.

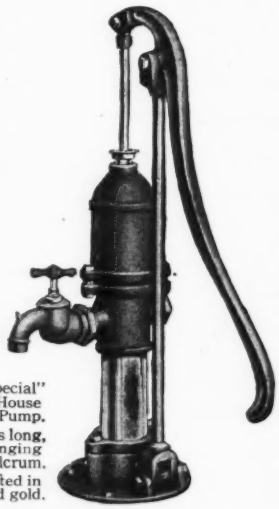
MALLEABLE FITTINGS

The Fitting with the Long, Tapered, Machine Reamed Thread
Perfect Proportions
Made of Air Furnace Iron

If you want the best specify **M** *this brand*

Illinois Malleable Iron Co.
1801 Diversey Parkway, Chicago, Ill.

The "Blue Special" Deming Force Pump



"Blue Special" House Force Pump. Has long, swinging fulcrum. Painted in blue and gold.

Write for Special Folder or Ask for Complete Catalogue

THE DEMING COMPANY, Salem, Ohio

ENGINEERING AGENCIES:
Henion & Hubbell, Chicago, Ill. Harris Pump & Supply Co., Pittsburg, Pa.
Ralph B. Carter Co., New York City, N. Y.

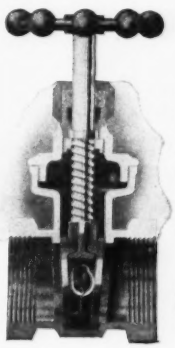
SOMETHING ENTIRELY NEW IN

SILL-COCKS

Semi-Finished, Polished aluminum wheel Style N. Style O---Heavy rough pattern built for service.

STYLE N — Both shown in Catalog D. — STYLE O

KINSEY & MAHLER CO. *PEORIA, ILL.*



1236 Kinds and Sizes of Detroit Radiator Valves

Because no **one** radiator valve can be made to give proper service under **all** conditions, you will find in the Detroit line a valve for **every** condition.

You will find a Detroit Radiator Valve **exactly** suited to your requirements.

Every Detroit Valve is the product of scientific study of the service for which it is designed.

Everywhere Detroit Valves are proving every day that each one is the right one for its particular place.

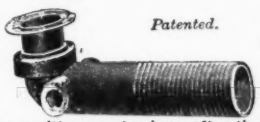
The Detroit catalog tells all about them. Write for catalog A-36.

DETROIT LUBRICATOR COMPANY.
DETROIT, U. S. A.
Largest manufacturers of radiator valves in the world.

RICE

The Best Bend

Constructed of cast-iron and brass and it is better than lead bends because it is more sanitary, durable and easier to install. Is the most practical connection between water closet and soil pipe. Made to calk or for Durham System. Write for booklet.



Patented.

The Edward J. Rice Mfg. Co.
Manufacturers
11 Plymouth Av. S.
ROCHESTER, N. Y.

The quality remains long after the price is forgotten.

OUR CATALOG
GEMS FOR THE CRAFTSMAN

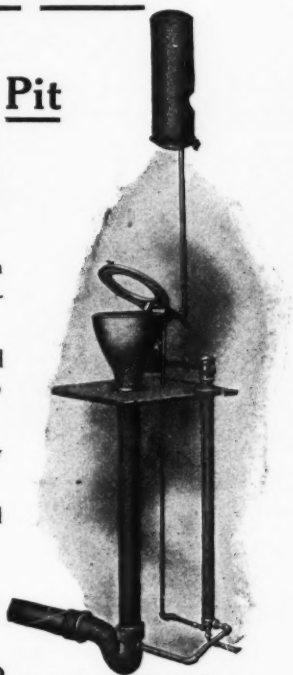
Describing

The "Gem" Auxiliary Heaters

Shall we mail it?

Davidson Heating & Construction Co.
HANOVER, PA.

"HAAS" Frost-Proof Water-Closet Requires No Pit



Here's a frost-proof Closet that's absolutely reliable and practically everlasting.

Very simple in construction and **very** easy to install---look at the illustration.

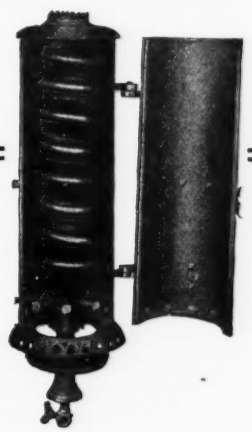
The flush is prompt and powerful, and cannot fail to operate perfectly.

Our goods are handled by all Jobbers.

Write at once for special literature and details.

PHILIP HAAS Co.
MANUFACTURERS
DAYTON OHIO

(Patented) COMBINATION No. 1.



Lawson Gas Water Heater
No. 22

A double coil heater that does the work every time. Put it on a 30 or 40 gallon boiler and see how quick you've got hot water.

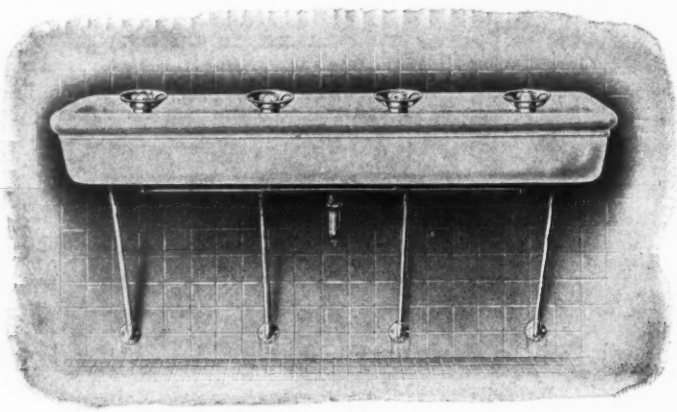
Here's a heater that will make you a reputation and a lot of money too. Send your order now for a sample and get a supply of advertising matter—good stuff that'll stir things up.

Write for complete catalog and prices.

LAWSON MANUFACTURING CO.
Homestead, Pa.

Wheeling Sanitary Drinking Fountains

The general crusade against the deadly drinking cup should be taken advantage of by every wide-awake jobber. There is a national demand for drinking devices that prevent the spread of disease.

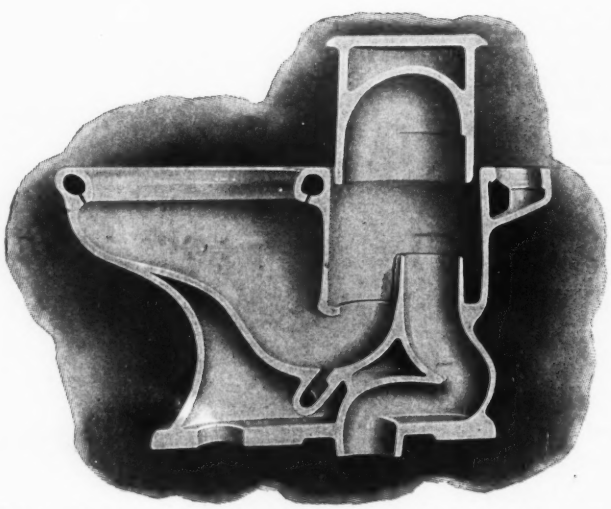


All Roll Rim, Continuous Stream Drinking Fountain. Solid Porcelain.

The Wheeling line of Drinking Fountains is the result of careful study to meet this demand. It embraces a variety of styles, only one of which is shown herewith, but all of which are illustrated in our new catalog.

Wheeling Cleanout —an entirely *new* thing in Syphon Jet closets. The trap is in two sections, the top lifting out as shown in cross sectional view herewith.

To lift out section and remove an obstruction is the work of a moment. No tools needed; no plumber. Easier and more profitable for plumbers to sell them than to clean clogged closets.



Wheeling Cleanout Syphon Jet Closet; cross section showing cleanout coping partly lifted out.

WRITE FOR CATALOG D, JUST OUT

The Wheeling Sanitary Manufacturing Company

General Offices - - - - Wheeling, W. Va.

INTERNATIONAL

EMPRESS SECTIONAL BOILER

Push Nipple Construction.

CAPACITIES

STEAM
700 to 6000 square feet.

WATER
1150 to 9900 square feet

CONSERVATIVELY RATED.

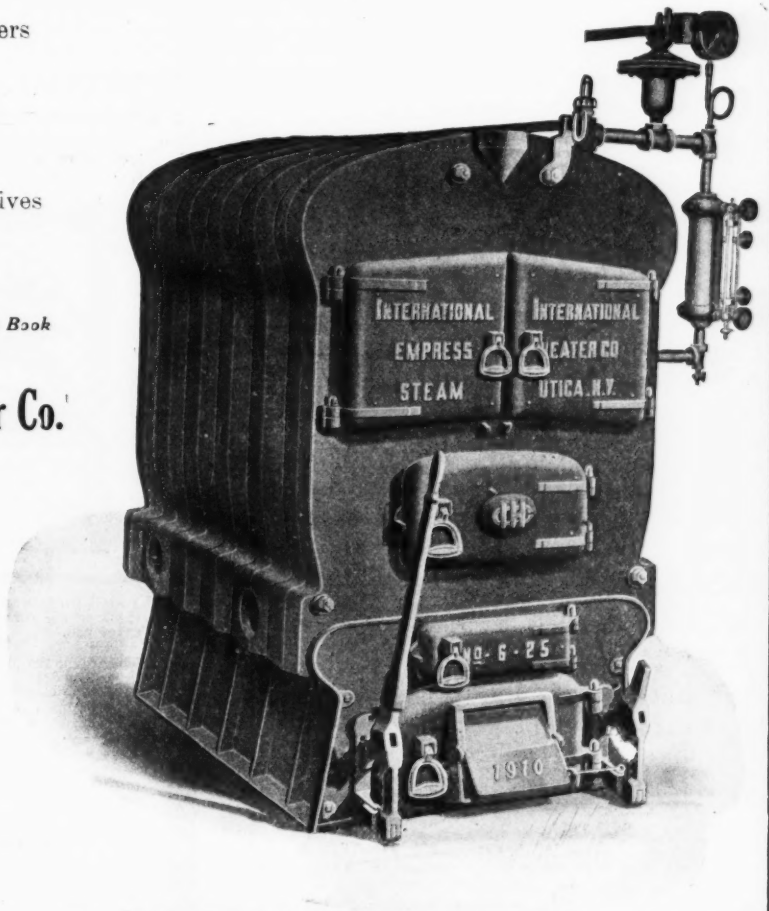
Made in thirty-three sizes and four widths of grate in both steam and water.

Deep Combustion chambers
Thin Waterways
Commodious ashpits
Long fire travel
Large amount of prime heating surface.

Our interesting catalog gives detailed explanation.

Send for it to-day.

Our New Handy Reference Book sent for the asking.



International Heater Co.

MAKERS OF BOILERS

Utica, N. Y.

BRANCHES AND WAREHOUSES:

New York, 601 W. 27th Street
Boston, 90 Sudbury Street
Chicago, 1933 Wentworth Avenue

DISTRIBUTERS:

Waldon Company, Winnipeg, Canada.
Farwell, Ozmun, Kirk & Co., St. Paul, Minn.

The Unusual Value in this *Leader Water System* Has Appealed to the Trade

Outfit Fig. 120-E

¶ Orders by mail, orders by telephone, orders by telegraph, a constant stream of them, are the result of the first announcement of our Direct Connected Hand *Water Systems* Fig. 101-E and 102-E.

¶ That the trade appreciates this labor-saving, trouble-saving, money-saving idea, is evidenced in every mail.

¶ To prevent further delay in filling orders, we have arranged for extra attention in our already large factory, and the night shift will help out.

¶ So send in your orders for these outfits, either vertical or horizontal, in the size you want.

¶ If you haven't our prices, ask us to send you Booklet 230.

Leader Iron Works

Decatur, Ill. and Owego, N. Y.

New York City Office, 15 William St.
Chicago Office, Monadnock Block

Paul Valve

Now is the Time to Buy

Air Valves
Hot Water Thermometers
Altitude Gauges

Does this

PAUL VALVE

look pretty good?

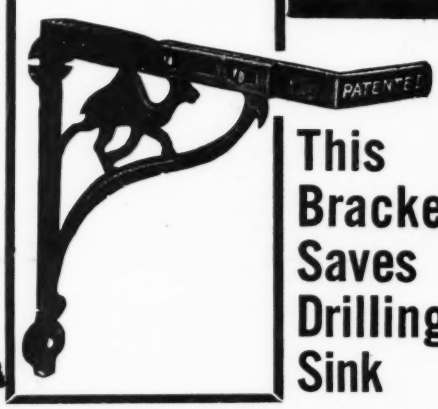
It's a Hummer!

Top Adjustment
Carbon Will Not
Buckle or Stick
Heavy Body
PRICE IS RIGHT

Send for our Valve Booklet. It makes good reading. A postal card brings it and our Discount Sheet.

Edelmann Products are Recognized for High Quality.

E. EDELMANN & CO., 47 W. Kinzie St., Chicago



This Bracket Saves Drilling Sink

Your customers will be pleased with this bracket—besides think of the time and labor on every sink attachment it saves you.

It Fits Any Size Sink

The arm of the bracket extends under the rim and around the front of the sink holding it firmly in place without drilling through the rim.

THE CAMPBELL EXTENSION SINK BRACKET

will **increase your profits** on every job and make satisfied customers for you. This bracket is interchangeable and can be used singly wherever one bracket is needed. It "**grips the sink tightly and never lets go.**" Write now for descriptive circular or ask your nearest jobber.

CAMPBELL MFG. CO.
GADSDEN, :: ALABAMA

We make a full line of Clean Out Fittings

Long Distance Telephone HARRISON 1953

Domestic Engineering

A Weekly Record of the World's Progress in Plumbing, Heating, Ventilation and all Matters Pertaining to Domestic Sanitation

(Entered as Second-Class Matter at the Postoffice at Chicago, Ill., under the Act of Congress of March 3, 1879)

Volume LVI SEPTEMBER 30, 1911 Number 14

PUBLISHED BY

The Domestic Engineering Co., 443 So. Dearborn St., Chicago

F. S. Kenfield.....President
F. P. Keeney.....Vice-Pres. and Manager
A. T. Leach.....Treasurer

Geo. N. Owen.....Eastern Representative
150 Nassau St., New York City

E. R. Ford.....Secretary
H. de Joannis.....Managing Editor
R. Herlov.....Assistant Editor

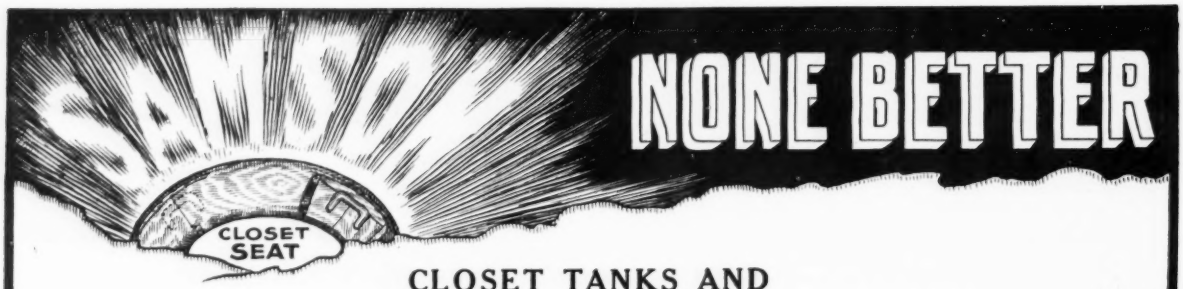
O. T. Carson.....Central States Representative
1579 E. 86 th St., Cleveland, O.

Terms of Subscription:

United States, Cuba and Mexico, $2.00 a year Canada - - - - $3.00 a year
Other Foreign Countries, $4.00 a year

CONTENTS

Water-Waste 321
Needed—A Parcels-Post 321
Vagaries in Bubble-Fountains 322
Selections from Examination-Papers in Plumbers' Work at Dundee Technical College 323-326
Notes from New Orleans 326
Business Management 327-328
Legal Decisions 329
Wentworth Institute 330-332
Massachusetts' New Public-Comfort Station Law 332
The Boss Talks to His New Foreman About Heating 333
Questions and Answers 334-335
A Uniform and National Plumbing Code: XVII 336-337
The Salt Lake City Convention Committees Appointed 337
The Metal Market 338
"Domestic Engineering" Cartoon No. LII 339
Among the Wholesalers 340-341
Patents 342
Classified Advertisements 62
Index to Advertisers 64
Buyers' Directory 66



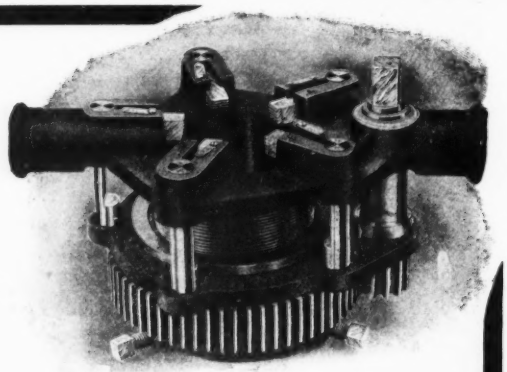
CLOSET TANKS AND
SEATS BEAR THIS
TRADE MARK :

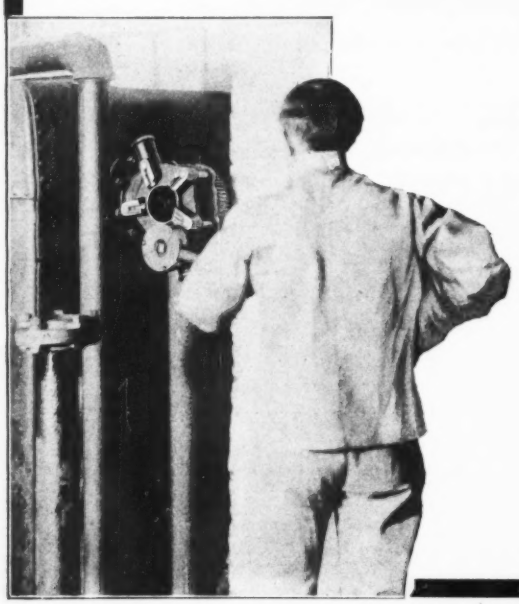
INSIST ON
"VAN AR CO"
QUALITY

IF IT IS A Samson IT IS STRONG

MADE BY
VAN ARNAM MFG. CO.
FORT WAYNE, INDIANA
SOLD BY ALL LEADING JOBBERS

A "TOLEDO" WILL SAVE
YOU MONEY ON THOSE
CLOSE QUARTER JOBS.





How many times did you ever have pipe to thread that was too large to thread it where it stood or the space was too small to operate the threader? Every time you had to take the pipe down and thread it on the bench.

This extra labor and time would have been avoided with Toledo Pipe Threaders, as shown by this man threading 4" pipe in only 10 inches of clear space between a tank and a brick wall with the Toledo No. 2.

Write for our New Booklet

THE TOLEDO PIPE THREADING
MACHINE CO. TOLEDO, O.

Kindly quote "Domestic Engineering" in writing advertisers.

Let This Booklet Help You

YOU are up against hard competition—you need every bit of possible leverage to help pull over to your side the profitable contracts—**let this little book help you.**

Hand it to the owner with whom you are figuring. If he is building a home—the space—economy advantages of United States Wall Radiators for bathroom and halls will be appreciated. If it is a church or school—the greater sightliness and saving in room of this type of radiator will win the approval of the board. If it is an industrial building the fewer repairs, greater permanency and cleanliness of the wall radiator over the pipe coil will quickly convince the hard headed business man.

All these advantages, attractively set forth in this booklet, will win you many a contract.

United States Wall Radiators

are acceptable on all kinds of work.

Write for a copy today, and then tell us how large a supply you need for your display floor.

THE COMPLETE LINE
UNITED STATES
BOILERS·RADIATORS·SUPPLIES

UNITED STATES RADIATOR CORPORATION

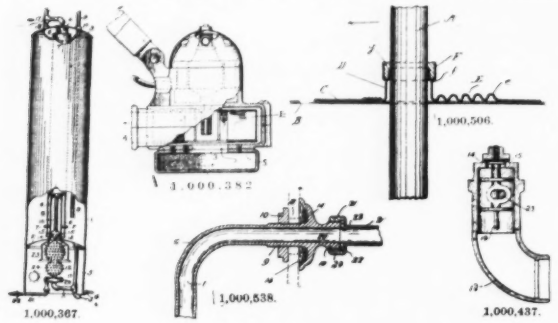
General Offices, Detroit, Michigan

Branches

NEW YORK, BOSTON, BALTIMORE, WASHINGTON, PHILADELPHIA
PITTSBURGH, DETROIT, CHICAGO, ST. LOUIS, OMAHA,
MINNEAPOLIS AND KANSAS CITY

Kindly quote "Domestic Engineering" in writing advertisers.

1,000,538. Bath or Basin Fitting. Philip Mueller, Decatur, Ill., assignor to H. Mueller Mfg. Co., Decatur, Ill., a corporation of Illinois. As a new article of manufacture, a bath-tub fitting comprising a supply-pipe having an externally threaded shank-portion adapted to extend through an aperture in a tub wall and a relatively long leg portion of less external diameter than the said shank portion, said leg portion having a bend at a point adjacent the shank portion, and clamping devices associated with the shank

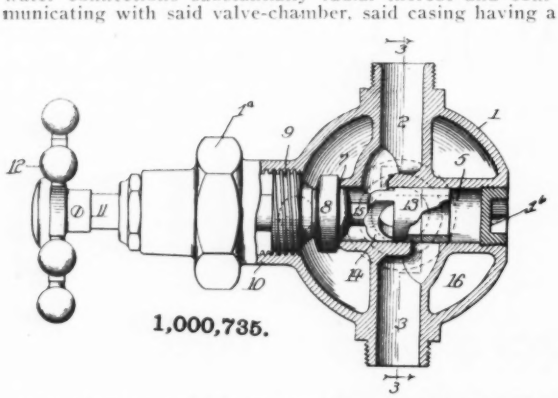


portion of the pipe for clamping the same to the wall of a bath-tub, one of said devices being adapted to be slipped over the said leg portion and into engagement with the threads of the shank portion, the construction and arrangement of parts being such that there are no separate coupling members in the supply-pipe between the bend and the shank portion.

1,000,506. Flashing. Dennis J. Galbraith, Plainfield, N. J. A roof-flashing comprising a cylindrical collar having a transverse plate thereon, said plate having a series of annular corrugations successively surrounding the collar and one another permitting the outer portion of the plate to be tilted with reference to the collar.

1,000,437. Tank-Flushing Mechanism. Gennaro G. Passaro, Stamford, Conn. A flushing mechanism comprising a pipe provided with a valve seat, a valve co-operating with said seat and having a stem provided with a transversely elongated eye, a crank-rod provided with a crank extending through said eye and normally located in one end of the latter when the valve is seated, a weighted handle for swinging said crank into engagement with one wall of said eye to unseat the valve, and means carried by the valve stem adapted to be engaged by the outflowing fluid to exert a pressure tending to seat said valve, the center of gravity of said handle being outside the axis of said crank-rod.

1,000,735. Lavatory-Fixture. John H. Johnson, Chicago, Ill., assignor to the Federal-Huber Co., Chicago. In a lavatory fixture a valve-casing having a valve-chamber substantially diametric thereof and hot and cold water connections substantially radial thereof and communicating with said valve-chamber, said casing having a

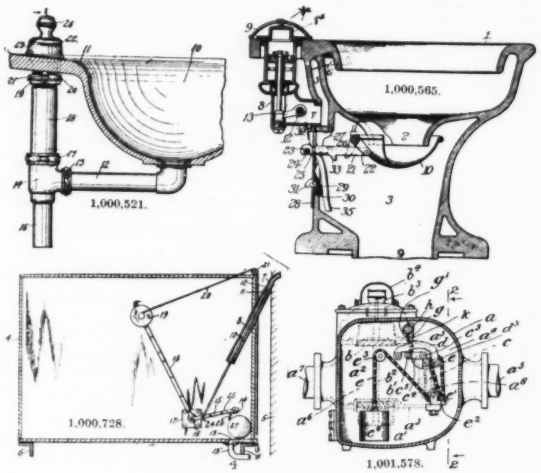


mixing-chamber entirely surrounding the valve-chamber and the water connections for the perfect mixing of the hot and cold water, a main valve controlling the communication between the valve-chamber and the mixing-chamber, a supplemental valve connected therewith and movable in unison with it, said supplemental valve being arranged to directly govern said hot and cold water connections, and a single means for operating both valves.

1,000,521. Basin-Waste Connection. Fred Hoffmann and Edward F. Niedecken, Milwaukee, Wis., assignors to Hoffmann & Billings Mfg. Co., Milwaukee, Wis., a corporation of Wisconsin. A pipe connection for basins and the like, comprising a clamping member mounted on the pipe and having a pair of diametrically opposite upstanding lugs to engage the bottom surface of the basin-slab, a nut threaded on the pipe and supporting the clamping member, a collar having a rounded shoulder, and a sleeve provided with a socket at its upper end to fit the rounded shoulder of the collar and permit of the sleeve being angularly adjustable with relation to the collar without interfering with the fit of the socket and shoulder, said sleeve being thereby adapted to fit the inclined upper surface of the basin-slab, and the nut serving to clamp the several parts together in their adjustments.

1,000,565. Water-Closet. Earl G. Watrous, Chicago, Ill. In a water-closet, the combination with a bowl having a bottom outlet, of a slow-closing valve mechanism for governing the supply of water for flushing the bowl, a pan controlling said bowl outlet, means common to said valve mechanism and pan for operating them, means whereby the operating connection with the pan may be rendered inoperative, and means for holding the pan in open position when thus disabled.

1,000,728. Flushing-Tank for Closets. Sándor Fürst and György Bankó, New York, N. Y. In a flushing-tank hav-



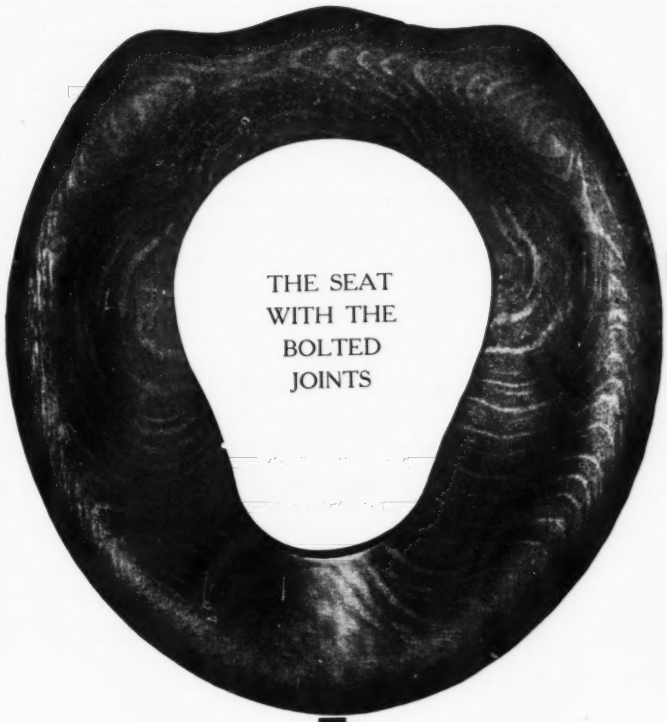
ing an inlet and an outlet, of a water-pipe communicating with said inlet, a flushing-pipe leading from said outlet, a bellcrank lever pivoted to said tank, a weight attached to the upwardly extending arm of said lever, a valve fastened to the other arm of said lever and adapted to control said outlet, a valve controlling said inlet connected with the second mentioned arm of said lever, a float, and a flexible connection between said float and said second mentioned arm of said lever.

1,001,578. Water-Meter. James M. Burton, Long Island City, N. Y., assignor to Neptune Meter Co., New York, N. Y., a corporation of New Jersey. The combination of a shell or casing, a vertical wall dividing the interior of the shell or casing into an inlet chamber and an outlet chamber and having a port therein, a pivoted valve normally closing the port and adapted to be opened by an increase in the pressure differential, a by-pass conduit around the valve, a metering device in said conduit, recording mechanism and means whereby the recording mechanism is operated by the movement of the valve.

Cast Iron Drive Ferrules

Any good mechanic can save two-thirds of his time and all the wiping metal by using Drive Ferrules.

GREENWOOD MFG. CO. - - Detroit, Mich.



A seat you may well be proud to sell to your best customer—

For it is a seat you can depend on to always give satisfaction.

Its glued tongue and groove joints are drawn tight with steel bolts, nuts and washers—an assurance of durable service.

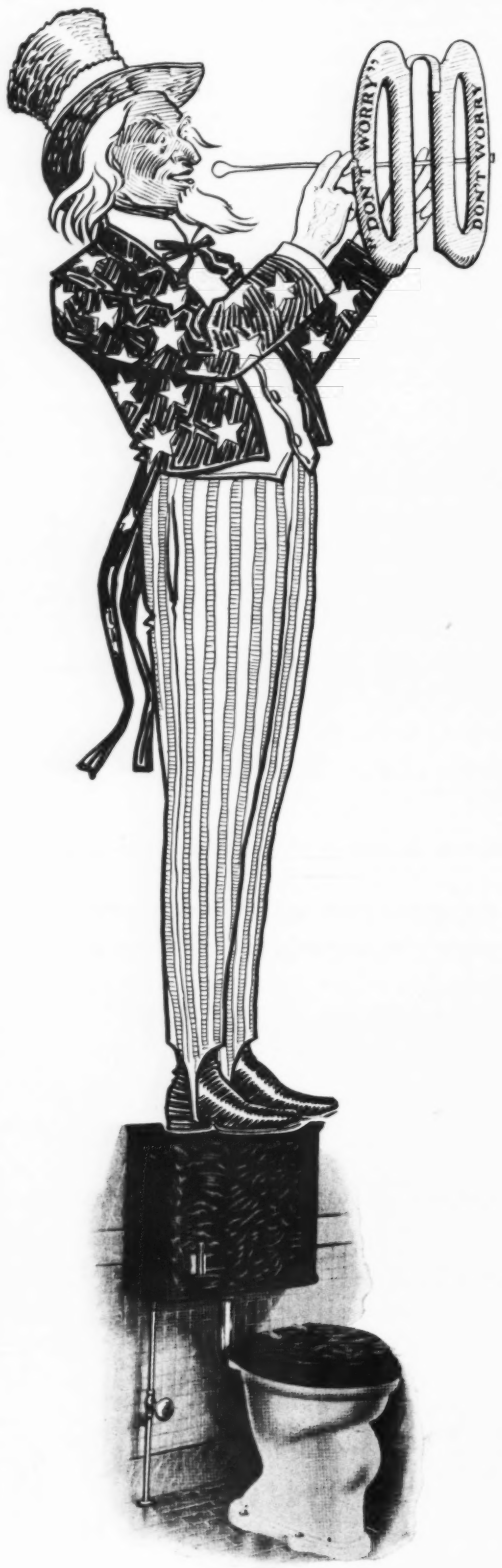
The "NEVER SPLIT"

is made of thoroughly seasoned, straight grained, handsome hardwood—four separate pieces—so that the grain runs entirely around the seat.

A moisture-proof, acid-proof varnish makes permanent the beautiful piano-like finish.

We would like to send you a miniature seat and also a catalogue. They are well worth having. Will you drop a postal for them today?

NEVER SPLIT SEAT CO.
EVANSVILLE, IND., U.S.A.



Uncle Sam Is Saying:

"From my standpoint and through these 'Peerless' Spectacles, I can see that national sanitation is practically an accomplished fact."

And Uncle Sam Is Right

"Peerless" products are among the most important factors in the maintenance of our country's health.

You Can Make Money

By selling the Best Sanitary Goods

Their Name Is "Peerless"

Faultless in construction, perfect in finish, efficient in use, durable under roughest service. You can sell and guarantee them anywhere. Get our catalog, our prices, our special offer to live plumbers.

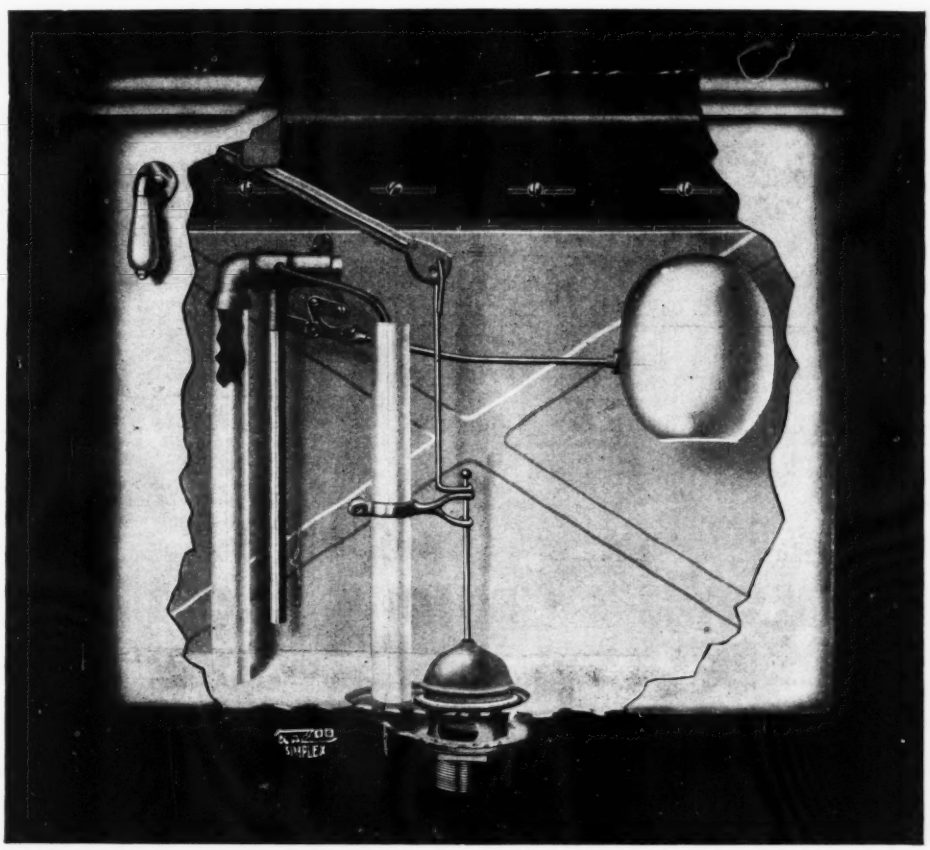
Save Worry. Make Money. Satisfy Your Trade. Use "Peerless."

The PEERLESS TRADE MARK SELLING CO.
EVANSVILLE, IND.

President Taft Came to Kalamazoo Especially to

See the City Where the Kazoo Simplex Tank is Made.

Get Tanked in Kalamazoo



Ask your jobber or write us direct

THE ENAMELED TANK CO.

Kalamazoo, Mich.

Classified Advertisements

Advertisements under this heading 4 cents per word per issue, address included. Remittance to be made with order. To insure insertion copy should be received not later than Wednesday morning.

Situations Wanted

You may be contemplating a change of position, or would like to be placed in touch with those who can offer you the employment you desire. There is no better medium in the plumbing and heating fields than the classified advertisement columns of "Domestic Engineering." The cost of advertising your requirements is nominal and the opportunities afforded are great. We receive requests daily for men to fill positions of all kinds. Advertisements should reach us no later than Wednesday morning of each week for insertion in the current issue.

SITUATION WANTED—PLUMBER, 17 years' experience; good lead-worker; steady and reliable; anywhere. Address No. 709, "Domestic Engineering." 30P.

POSITION WANTED—AS SALESMAN of plumbing specialties and supplies, or plumbing and heating goods in combination over South and South-west territories; 16 years' successful experience. Intimately and solidly acquainted with the entire southern trade. Best of references. Address No. 704, "Domestic Engineering." 9-16P.

"Domestic Engineering" Patent Bureau is the result of many inquiries for reliable patenting facilities. "Domestic Engineering" has established a Patent Bureau in Chicago for the service of those whose location may not enable them to make personal investigation of the reliability of patenting offices or whose lack of acquaintance with the subject makes it desirable that efficient protection should be given them from fraud or imposition. Any of our readers desiring to patent any inventions and devices should address communications to F. Gerlach, "Domestic Engineering," Patent Department, 443 S. Dearborn St., Chicago. No charge will be made for consultation.

Situations Open.

You may desire employees of high caliber, draftsmen of ability, or efficient salesmen. These columns enable you to discover at once all the available material in the field at the time of your need. Our advertisements bring replies from all those who make a habit of reading and studying our columns, and readers of good trade-journals are among the advanced type of men engaged in the industries we represent. Do you need somebody today? We shall be pleased to receive your advertisement.

WANTED — EXPERIENCED VALVE salesman to call on jobbing trade in central west, by established manufacturer making complete line. Experience and territory covered, age, and salary expected, should be stated in application. Address X Y Z, "Domestic Engineering." 14

WANTED—A young or middle-aged man to take general charge of office of plumbing and heating concern, one who is familiar with double-entry bookkeeping and prefer one who has some knowledge of the plumbing and heating business. Good position to the right man; references required; location within 115 miles of Chicago. Address No. 705, "Domestic Engineering." 9-30

MISCELLANEOUS.

IRON CASTINGS FURNISHED BY ONE of the largest manufacturing plants in the East, having a foundry and machine shop with the most modern equipment. Any tonnage of plain or cored castings of any weight, particularly heating, ventilating and plumbing castings, may be furnished. Especially attractive arrangements will be made for a continuous tonnage at low prices. Address with full information regarding requirements, "Special Castings Department," care "Domestic Engineering." tf.

WANTED—COPY OF BELDEN'S DISCOUNT tables, pocket size. Will any of our subscribers having copy which they wish to dispose of, kindly notify Book Department, "Domestic Engineering," quoting price for the book.

SELL YOUR SURPLUS COUPLINGS and fittings. Write us. The A. & J. Mfg. Co., 557 W. Lake St., Chicago. tf.

For Sale

Somebody wants something that you have. You want something that somebody else has got. We can bring you together. If you desire to dispose of your business or purchase that of somebody else, you can effect your purpose by advertising in these columns. Tell us plainly what you want and we will write your advertisement for you and present it in the most effective manner, free of charge. Let us hear from you at once. We are at your service.

FOR SALE—PLUMBING AND HEATING business in an Iowa town. Address No. 710, "Domestic Engineering."

FOR SALE—A GOOD OPPORTUNITY for a first-class plumber. Will sell one-half or entire business of plumbing, steam and gas-fitting, about $2,000, in a fast-growing city in southern Michigan. Address No. 711, "Domestic Engineering."

FOR SALE—A PLUMBING AND HEATing establishment in a live Iowa town of 6,000 inhabitants. Good business and good reasons for selling. Will not require much money down. Address No. 712, "Domestic Engineering."

A TRADE LIBRARY IS A CONSTANT SOURCE OF STRENGTH

What the Tool is to the Hand, a Good Book is to the Brain. It offers opportunity for greater efficiency and better remuneration for service rendered. Somewhere sometime some one has written a paragraph that will spur you to more profitable things, a paragraph that will come to your aid in time of difficulty. Such paragraphs abound in the books listed below.

WE PUBLISH:

TABLE—LOSS OF PRESSURE PER Lineal Foot in Ten-Thousandths of a Pound of the Different Coefficients of Friction, by Isaac Chaimovitsch, M. E. Price 50c Postpaid.

SANITARY SEWERAGE OF BUILDINGS. An authoritative statement of the principles and practice of sewering buildings, including the design and construction of plumbing systems, disposal of sewage in unsewered localities, etc. 8x5 in.; bound in cloth; 209 pp. Postpaid, $1.50.

MAKING THE BUSINESS PAY. Letters of John Burton, retired successful plumber and steamfitter, to his nephew still in business. Practical, instructive, entertaining, a guide to better business. Cloth bound, 5½x7¾ in.; 168 pp. Postpaid, $1.00.

ROUGHING-IN HOUSE DRAINS. A complete guide to the work of roughing-in plumbing, from the digging of the sewer to the finishing length of the soil and vent stacks, giving each step to be taken and telling how and why it is done. 6¼x4¼ in.; 184 pp.; bound in boards. Postpaid, 50 cents.

SANITATION IN THE MODERN HOME. An invaluable guide to the architect, plumber, heating engineer and house owner, telling just what is necessary to make a home completely sanitary from the subsoil to the roof. 8x5¼ in.; 273 pp.; bound in cloth. Postpaid, $2.00.

DEAN'S STEAM FITTER'S COMPUTATION BOOK. Tables for finding cubical contents of rooms and radiation required, also general information on points of interest to steam and hot water fitters Flexible cloth bound, 5x7½ in., 90 pp Postpaid, $2.50.

SIZE OF FLOW AND RETURN STEAM MAINS. Contributions from thirty heating engineers of different cities in United States, giving current practice; full of practical advice and useful tables. Bound in boards, 6¼x4¼ in., 104 pp. Postpaid, 50 cents.

TABLES FOR CALCULATING SIZES OF STEAM PIPES. These tables furnish a method of sizing the pipes for low pressure steam heating based upon the loss of pressure per lineal foot, without laborious mathematical calculations. Bound in cloth; 4½x6⅞ in.; 47 pp. Postpaid, $2.00.

A COMPLETE GUIDE TO TESTING PLUMBING. A full treatise showing the necessity of testing new and old work; methods of testing fully described; 7½ x 5¼ in.; seventeen illustrations. Postpaid, 25 cents.

Address, DOMESTIC ENGINEERING, 443 South Dearborn St., Chicago

Kindly quote "Domestic Engineering" in writing advertisers.

This Radiator Foot Rest is Adjustable

Use them for radiators—use them for bath tubs and other fixtures. The value of the time saved on only one job will pay for them—then they continue to save time right along. Your jobber will supply you—if not, we will.

The Jennison Company, Fitchburg, Mass.

LEARN PLUMBING

STUDENTS do the actual work and may begin the course any time. The Technical Training, in addition to the shop work, is invaluable and not otherwise obtainable. Our FREE CATALOG tells of the cost, length of time usually required, etc. ASK FOR IT.

St. Louis Trade School
4478 Olive St., St. Louis, Mo.

Put One Man on the Job

With the FORBES Pipe Cutting and Threading Machine and note how quickly and easily he can thread and cut off pipe from ¼ inch up to 15 inches in diameter. The FORBES is simple, compact, light, strong, durable, portable and accurate. It possesses many exclusive features.

Write for Catalog

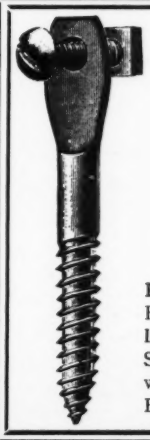
Curtis & Curtis Co.
25 Garden Street, Bridgeport, Conn.

MR. PLUMBER. DO YOU REALIZE?

That it would be to your advantage to carry a stock of "The Ladies' Friend" Water Power Washing Machines. They come right in your line of work in fitting up family laundries, and there is a large demand for them wherever the water pressure exceeds 25 lbs.

"THE LADIES' FRIEND" GEARLESS IS THE Most Simple and Durable Water Power Machine
No complicated parts to get out of order Write today

The D. L. Bates & Bro. Co., Dayton, Ohio



Flat Head Lag Screws with Bolt

CENCO PIPE HANGERS

Perforated Extension Bar in 5 or 10 ft. lengths.
Holes one-half inch apart.

Manufactured by

C. ERWIN NORMAN & CO.
29 WEST MICHIGAN STREET, CHICAGO

Standard Ring with Bolt

Kindly quote "Domestic Engineering" in writing advertisers.

INDEX TO ADVERTISEMENTS

NOTICE TO ADVERTISERS: **Copy and cuts for advertisements intended for a particular issue should reach the office of Domestic Engineering on Monday of the previous week if it is desired that a proof of the advertisement shall be submitted. New advertisements can be received up to noon of Monday of the week of issue, but no proof can be shown.**

The Star (*) indicates that the advertisement is inserted every other week, the dagger(†) once a month.

September 30, 1911.

A

*A. D. Manufacturing Co., Detroit.... —
American District Steam Co., Lockport, N. Y. 6
American Valve Co., Indianapolis.... 8
†Anderson-McCutchen Co., Peekskill, N. Y. —
†Anderson Tool & Supply Co., W. H., Detroit ....Front cover
Armstrong Mfg. Co., Bridgeport, Conn. 3
*Ayling & Reichert Co., Toledo, O.... —

B

*Badger & Sons Co., E. B., Boston.... —
*Barrett Mfg. Co., The Jas., Boston.. ....Inside back cover
*Bates & Bro. Co., D. L., Dayton, O... 63
*Beaton & Corbin Mfg. Co., Southington, Conn 10
*Becker Mill Co., Marietta, O. —
*Belknap Mfg. Co., Bridgeport, Conn.. —
*Berger Bros. Co., Philadelphia. —
*Bignall & Keeler Mfg. Co., Edwardsville, Ill. —
†Blairsville Enameled Ware Co. Blairsville, Pa. —
*Blake Specialty Co., Rock Island, Ill. 8
Borden Co., Warren, O. —
Boston Brass Co., Boston. ....Inside back cover
†Brock Wrench Mfg. Co., New York City 7
†Buffalo Meter Co., Buffalo, N. Y. —
Buffum Tool Co., Louisiana, Mo. —
Bullard Specialty Co., Tiffin, O. 8

C

Cahill Iron Works, Chattanooga, Tenn. 73
Campbell Mfg. Co., Gadsden, Ala. 18
Canfield Co., H. O., Bridgeport, Conn. 80
*Capitol Brass Works, Detroit. —
*Central Brass Mfg. Co., Cleveland, O. —
*Central Closet Mfg. Co., Kokomo, Ind. 14
*Champion Safety Lock Co., Geneva, O. —
*Chicago Faucet Co., Chicago. —
Cochran Pipe Wrench Mfg. Co., Chicago 7
*Compound Injector & Specialty Co., Chicago —
*Consolidated Engineering Co., Chicago —
Cripps Mfg. Co., A. G., Akron, O.... —
*Crown Die & Tool Co., Chicago. —
†Cudell, F. E., Cleveland, O. —
Curtis & Curtis Co., Bridgeport, Conn. 63

D

Davidson Heating & Construction Co., Hanover, Pa. 15
*Davis, Louis N., West Chester, Pa... —
Dayton Pump & Mfg. Co., Dayton, O. 7
Deming Co., The, Salem, O. 14
*Detroit Lubricator Co., Detroit. 15
Detroit Sanitary Supply Co., Detroit.. 80
Dixon Crucible Co., Joseph, Jersey City, N. J. ....Inside back cover
*Dunham Co., C. A., Marshalltown, Ia. —

E

Edelmann & Co., E., Chicago. 18
Electric Heat Regulator Co., Minneapolis —
Eljer Co., Cameron, W. Va....Back cover
Enameled Tank Co., Kalamazoo, Mich. 61
*Estabrook's Sons, R., So. Boston, Mass. 80
Eureka Water Heater Co., Chicago... 8
†Excelsior Bag & Mfg. Co., Troy, N. Y. —

F

*Federal-Huber Co., Chicago. —
Flagg & Co., Stanley G., Philadelphia —
Fleck Bros. Co., Philadelphia. ....Inside front cover
†Flint & Walling Mfg. Co., Kendallville, Ind. —
†Foster Engineering Co., Newark, N. J. 13
*Frankfort Brass Mfg. Co., Frankfort, Ind. —
Frost Mfg. Co., Kenosha, Wis. 2

G

*Galard Co., Newark, N. J. —
*Gerstein Bros. & Cooper, South Boston, Mass. ....Inside back cover
*Glauber Brass Mfg. Co., Cleveland, O. —
†Globe Gas Light Co., Boston. —
†Graham Chem. Potteries Wks., Chas., Brooklyn —
Greenwood Mfg. Co., Detroit, Mich... 58
*Great Western Pottery Co., Kokomo, Ind. 13
Gurney Heater Mfg. Co., Boston. 1

H

*Haas Co., Philip, Dayton, O. 15
†Hart Mfg. Co., Cleveland, O. —
*Hartley Co., C. J., Decatur, Ill. 9
*Hayes Mfg. Co., Paterson, N. J. —
Herbert Boiler Co., Chicago. 1
*Herschler, A. D., Ashland, O. —
*Hoffman Heater Co., Lorain, O. 75
Honeywell Heating Specialty Co., Wabash, Ind. ....Front cover
Horigan Supply Co., St. Joseph, Mo.. 12
Hughson Steam Specialty Co., Chicago 2
*Humphrey Co., Kalamazoo, Mich. —

I

Illinois Electrotype Co., Chicago. —
Illinois Malleable Iron Co., Chicago... 14
*Imperial Brass Mfg. Co., Chicago. —
†International Heater Co., Utica, N. Y. 17
Iron City Sanitary Mfg. Co., Pittsburgh, Pa. 71
†Iroquois Engineering Co., St. Louis, Mo. —

J

†Jarecki Mfg. Co., Erie, Pa. —
†Jenkins Bros., New York City. —
Jennison Co., Fitchburg, Mass. 63
†Jewell Mfg. Co., Auburn, N. Y. —
*Johnson & Son Co., W. H., Indianapolis, Ind —

K

*Kellogg-Mackey Co., Chicago. —
*Kelly & Bros., Thos., Chicago. —
*Kemp Mfg. Co., C. M., Baltimore, Md. —
*Kennedy Valve Mfg. Co., Elmira, N. Y. —
Kewanee Boiler Co., Kewanee, Ill. 11
Kewanee Water Supply Co., Kewanee, Ill. 74
King Mfg. Co., Birmingham, Ala. 72
*Kingston Granite Tub Works, Kingston, N. Y. —
*Kinsey & Mahler Co., Peoria, Ill. 15
Kohler Sons Co., J. M., Sheboygan, Wis. 12
*Kroeschell Bros. Co., Chicago. —
*Krus Engraving Co., Milwaukee, Wis. 75

L

*Lawson Mfg. Co., Homestead, Pa. 15
Leader Iron Works, Decatur, Ill. 18
Loew Mfg. Co., Cleveland, O. —
Lord & Burnham Co., Irvington, N. Y. 11

M

*Maddock's Sons Co., Thos., Trenton, N. J. —
*McCrum-Howell Co., New York City.. —
McDermont & Mory, Dayton, O. 2
McDonald Vacuum & Vapor Specialty Co., Cleveland, O. —
Mechanical Rubber Co., Chicago. 10
*Mechanical Rubber Co., Cleveland, O. 5
*Milwaukee Heat Generator Co., Milwaukee, Wis. —
*Moline Vacuum Vapor Heating Co., Moline, Ill. —
†Monarch Brass Co., Cleveland..76 and 77
*Monash-Younker Co., Chicago. Front cover
*Mouat Vapor Heating Co., Cleveland, O. 10
Mueller Mfg. Co., H., Decatur, Ill. ....Front cover and 4

N

*National Adjustable Pipe Bushing Co., Cleveland, O. —
National Steam Specialty Co., Chicago 3
Never-Split Seat Co., Evansville, Ind.. 59
*Norman & Co., C. Erwin, Chicago. 63
Norristown Magnesia & Asbestos Co., Norristown, Pa. 14
*Northern Brass Mfg. Co., Waukegan, Ill. ....Front cover
Nye Tool & Machine Works, Chicago. 5

O

*Ohio Brass Co., Mansfield, O. 9

P

Parker Co., Chas., Meriden, Conn. 2
*Peerless Selling Co., Evansville, Ind.. 60
*Penn Engineering Co., Philadelphia.. 10
*Perkes, Chas., Estate of, Philadelphia —
*Pfau Mfg. Co., The, Cincinnati, O. —
*Pittsburgh Brass Mfg. Co., Pittsburgh —
Pittsburg Water Heater Co., Pittsburgh —
Plumbers' Woodwork Co., Algoma, Wis. 80
Prudential Heating Co., Akron, O. ....Inside front cover

R

*Rapid Heater Co., Grand Rapids, Mich. —
*Raymond Lead Co., Chicago. —
Rice Mfg. Co., Edw. J., Rochester, N. Y. 15
Ross Valve Mfg. Co., Troy, N. Y. ....Inside back cover
*Rundle-Spence Mfg. Co., Milwaukee, Wis. —

S

*St. Louis Trades School, St. Louis, Mo. 63
†Sanitary Mfg. Co., Hamilton, O. —
*Saunders' Sons, D., Yonkers, N. Y. —
*Scaife & Sons Co., Wm. B., Pittsburgh 11
Shirley Radiator & Foundry Co., Shirley, Ind. 2
Simmons Co., John, New York City.. 6
Smith & Egge Mfg. Co., Bridgeport, Conn. 2
Smooth-On Mfg. Co., Jersey City, N. J. 6
Standard Heating & Radiator Co., Pittsburgh 1
Standard Pump & Engine Co., Cleveland, O. —
Standard Sanitary Mfg. Co., Pittsburgh 69
*Stanley Universal Wrench Co., Alliance, O. —
Stearns & Co., F. M., Jamestown, N. Y. 2
Stewart Mfg. Co., Cleveland, O. 2
†Street & Kent Mfg. Co., Chicago. —

T

*Teahen, Jas. M., Detroit, Mich. 75
*Thatcher Furnace Co., Chicago. —
Toledo Pipe Threading Machine Co., Toledo, O. 20
*Trenton Brass & Machine Co., Trenton, N. J. —
*Trenton Potteries Co., Trenton, N. J. 65
*Trimont Mfg. Co., Boston. 7
†Tuller Hotel, Detroit. —

U

Union Sanitary Mfg. Co., Noblesville, Ind. 67
*United States Radiator Corporation, Detroit, Mich. 57

V

Van Arnam Mfg. Co., Fort Wayne, Ind. 20
*Vapor Heating Co., Philadelphia. —
Vogel Co., Jos. A., Wilmington, Del... 11

W

*Walworth Mfg. Co., Boston. —
*Wheeling Sanitary Mfg. Co., Wheeling, W. Va. 16
†Whitlam Mfg. Co., J. C., Cleveland, O. —
†Williams & Co., J. H., Brooklyn. —
Williamsport Radiator Co., Williamsport, Pa. 4
*Wilks Mfg. Co., S, Chicago. —
*Wolff Mfg. Co., L., Chicago. 79
Wood Mfg. Co., John, Conshohocken, Pa. 9
*Wyckoff & Son Co., A., Elmira, N. Y. —

Kindly quote "Domestic Engineering" in writing advertisers.

THE DONOVAN FLANGE

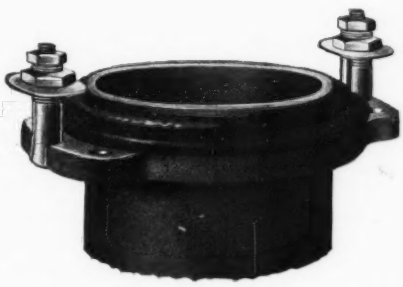


Figure It Out :: You may find just enough saving to land that job

EVERY Master Plumber has his eye open for opportunity. **The Donovan Floor Connection** spells opportunity with a capital O. You've seen lots of floor flanges in the past, some good, bad and indifferent. But you were never offered one like the **Donovan;** one which *proves* a perfect joint, can be connected to lead or iron pipe of any kind and effecting a saving in cost in both time and material. The **Donovan Flange** solves the problem by a water sealed joint at the floor. Just the way you want to be notified of trouble.

Study the Comparative Costs

Notice that we've used the List Price of our Flange against estimated *cost* of other materials. Even at that the advantage is ours.

Old Method		New Method	
One 4 inch Lead Bend . .	$0.85	DONOVAN Flange List Price	$1.50
One 4 inch Calking Nipple .	.40	Iron Bend	.50
1½ pounds of Solder . . .	.30	Labor	.25
One Brass Flange Connection	.35		$2.25
Labor	.50		
	$2.40		
Result—Doubtful joint at floor		**Result—Perfect connection**	

Were the cost of installing the **Donovan Flange** *even as much* as the old method, the fact that a perfect joint *was assured* should cause every plumber to adopt it immediately. Let us send you free booklet describing it.

The Trenton Potteries Company **TRENTON, NEW JERSEY**

"Domestic Engineering" Buyers' Directory

Anchors, Bolts and Drills.
Star Expansion Bolt Co.

Babbitt Metal.
Pittsburgh Brass Mfg. Co.
Raymond Lead Co.
Wolff (L.) Mfg. Co.

Balls for Flush Tanks, Fuller Balls, Etc.
Pfau Mfg. Co.

Basins, Catch, Cast-Iron.
Compound Injector & Specialty Co.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Wolff (L.) Mfg. Co.

Baths and Bath Supplies.
Blairsville Enameled Ware Co.
Cahill Iron Works.
Day Metallic Co.
Fleck Bros. Co.
Glauber Brass Mfg. Co.
Imperial Brass Mfg. Co.
Iron City Sanitary Mfg. Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
McCrum-Howell Co.
National Sanitary Mfg. Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Trenton Potteries Co.
Union Sanitary Mfg. Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Bath-Cock, 4½ Fuller.
Northern Brass Mfg. Co.

Benders, Pipe.
Buffum Tool Co.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Boilers, Firebox.
Herbert Boiler Co.

Boilers, Heating, Hot Water.
Anderson-McCutcheon Co.
Continental Radiator & Fdry. Co.
Gurney Heater Mfg. Co.
Herbert Boiler Co.
Ideal Heating Co.
Illinois Malleable Iron Co.
International Heater Co.
Kellogg-Mackay Co.
Kewanee Boiler Co.
Kroeschell Bros. Co.
Lord & Burnham Co.
McCrum-Howell Co.
Milwaukee Heat Generator Co.
Prudential Heating Co.
Rapid Heater Co.
Scaife (Wm. B.) & Sons Co.
Shirley Radiator & Foundry Co.
Thatcher Furnace Co.
Wilks (S.) Mfg. Co.
Williamsport Radiator Co.

Boilers, Heating, Steam.
Continental Radiator & Fdry. Co.
Gurney Heater Mfg. Co.
Herbert Boiler Co.
Illinois Malleable Iron Co.
International Heater Co.
Kellogg-Mackay Co.
Kewanee Boiler Co.
Kroeschell Bros. Co.
Lord & Burnham Co.
McCrum-Howell Co.
Prudential Heating Co.
Rapid Heater Co.
Scaife (Wm. B.) & Sons Co.
Shirley Radiator & Foundry Co.
Thatcher Furnace Co.
U. S. Radiator Corporation.
Wilks (S.) Mfg. Co.
Williamsport Radiator Co.

Boilers, Range.
Badger (E. B.) & Sons Co.
Fleck Bros. Co.
Gerstein Bros. & Cooper.
Hayes Mfg. Co.
Scaife (Wm. B.) & Sons Co.
Simmons (John) Co.
Wolff (L.) Mfg. Co.

Books for Plumbers and Steamfitters.
"Domestic Engineering."

Bowls, Water Closet
Becker Mill Co.
Continental Radiator & Fdry. Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Brackets, Lavatory.
Blairsville Enameled Ware Co.
Chicago Faucet Co.
Glauber Brass Mfg. Co.
Iron City Sanitary Mfg. Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Parker (Chas.) Co.
Perkes (Chas.) Estate of.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Trenton Potteries Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Brackets, Sink.
Blairsville Enameled Ware Co.
Campbell Mfg. Co.
Continental Radiator & Fdry. Co.
Glauber Brass Mfg. Co.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Parker (Chas.) Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.

Branches, Y and Double Y.
Walworth Mfg. Co.

Brass Goods, Compression.
Allyne Brass Fdy. Co.
Burlington Brass Works.
Central Brass Mfg. Co.
Detroit Sanitary Supply Co.
Fleck Bros. Co.
Glauber Brass Mfg. Co.
Imperial Brass Mfg. Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Monarch Brass Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.) Estate of.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Trenton Brass & Machine Co.

Brass Goods, Gas.
Central Brass Mfg. Co.
Detroit Brass Works.
Fleck Bros. Co.
Glauber Brass Mfg. Co.
Hughson Steam Specialty Co.
International Heater Co.
Jarecki Mfg. Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.) Estate of.
Prudential Heating Co.
Wolff (L.) Mfg. Co.

Brass Goods, Ground Key.
Allyne Brass Fdry. Co.
Central Brass Mfg. Co.
Detroit Brass Works.
Farnan Brass Works.
Fleck Bros. Co.
Glauber Brass Mfg. Co.
Imperial Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Monarch Brass Co.
Mueller (H.) Mfg. Co.
Trenton Brass & Machine Co.

Brass Goods, Self-Closing.
Burlington Brass Works.
Central Brass Mfg. Co.
Chicago Faucet Co.
Farnan Brass Works.
Fleck Bros. Co.
Glauber Brass Mfg. Co.
Imperial Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.) Estate of.
Pittsburgh Brass Mfg. Co.

Brass Goods, Steam.
Detroit Lubricator Co.
Fleck Bros. Co.
Glauber Brass Mfg. Co.
Jarecki Mfg. Co.
Kennedy Valve Mfg. Co.
Perkes (Chas.) Estate of.
U. S. Radiator Corporation.

Brass Goods, Water.
Burlington Brass Works.
Central Brass Mfg. Co.
Farnan Brass Works.
Fleck Bros. Co.
Glauber Brass Mfg. Co.
Jarecki Mfg. Co.
Kennedy Valve Mfg. Co.
Monarch Brass Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.) Estate of.
Street & Kent Mfg. Co.
Trenton Brass & Machine Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

Bronze Powders.
Continental Radiator & Fdry. Co.
Lord & Burnham Co.

Burners, Garbage.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Kewanee Boiler Co.
Wilks (S.), Mfg. Co.

Bushings.
National Adjustable Pipe Bushing Co.

Calking Tools.
Mueller (H.) Mfg. Co.

Cements.
Stearns, F. M. & Co.
Whitlam (J. C.) Mfg. Co.

Cesspools, Brass.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.

Cesspools, Cast-Iron.
Estabrook's (R.) Sons.
Standard Sanitary Mfg. Co.

Cleanouts, Cast-Iron.
Barrett Mfg. Co.
Blake Specialty Co.
Campbell Mfg. Co.
Compound Injector & Specialty Co.
Wolff (L.) Mfg. Co.

Closet Bends.
Compound Injector & Specialty Co.
Cosgrove-Cosgrove Mfg. Co.
Rice (Ed. J.) Mfg. Co.
Southern Pipe & Foundry Co.

Closet Tanks.
Wood (John) Mfg. Co.

Cocks, Ball.
Becker Mill Co.
Boston Brass Co.
Central Closet Mfg. Co.
Continental Radiator & Fdry. Co.
Frost Mfg. Co.
Herschler, A. D.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Nye Tool & Machine Works.
Parkinson Mfg. Co.
Peerless Selling Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Van Arnam Mfg. Co.
Walworth Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Cocks, Basin.
Imperial Co.

Cocks, Bath, 4½.
Mueller (H.) Mfg. Co.
Northern Brass Mfg. Co.

Cocks, Drinking-Fountain, Self-Closing.
Chicago Faucet Co.

Coils and Bends, Pipe.
Kellogg-Mackay Co.
Wolff (L.) Mfg. Co.

Cold Chisels.
Anderson (W. H.) Tool & Supply Co.
Buffum Tool Co.
Mueller (H.) Mfg. Co.

Coupilngs, Lead Pipe.
Allyne Brass Fdry. Co.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.) Estate of.
Wolff (L.) Mfg. Co.

Couplings, Union.
Burlington Brass Works.
Capitol Brass Works
Glauber Brass Mfg. Co.
Illinois Malleable Iron Co.
Jarecki Mfg. Co.
Mueller (H.) Mfg. Co.
Stewart Mfg. Co.
Street & Kent Mfg. Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

Covering, Pipe and Boiler.
Continental Radiator & Fdry. Co.
International Heater Co.
Kellogg-Mackay Co.
Norristown Magnesia & Asbestos Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.
Wyckoff, (A.) & Son Co.

Coverings, Steam Pipe.
Wyckoff (A.) & Son Co.

Curb Boxes.
Buffalo Meter Co.
Mueller (H.) Mfg. Co.
Simmons (John) Co.
Walworth Mfg. Co.

Cuspidors.
McDermont & Mory.

Dies.
Armstrong Mfg. Co.
Bignall & Keeler Mfg. Co.
Borden Co.
Crown Die & Tool Co.
Curtis & Curtis Co.
Hart Mfg. Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Loew Mfg. Co.
Nye Tool & Machine Works.
Toledo Pipe Threading Machine Co.
U. S. Radiator Corporation.

Drains, Floor.
Weiler Bros.

Drains, Floor and Garage.
Compound Injector & Specialty Co.

Drains, Refrigerator.
Compound Injector & Specialty Co.

Drinking Fountains.
Chicago Faucet Co.
Kohler (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Rundle-Spence Mfg. Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.

Drum Traps and Clean-Outs.
Blake Specialty Co.
Compound Injector & Specialty Co.

Earthenware, Sanitary.
Eljer Co.
Graham (Chas.) Chemical Potteries Co.
Great Western Pottery Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Sanitary Mfg. Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Ejectors and Injectors.
Champion Safety Lock Co.
Jenkins Bros.

Enameled-Iron Sanitary Ware.
Cahill Iron Works.
Enameled Tank Co.
Iron City Sanitary Mfg. Co.
Kohler (J. M.) Sons Co.
McCrum-Howell Co.
Pittsburg Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Union Sanitary Mfg. Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Engines, Gas and Gasoline.
Standard Pump & Engine Co.

Engines, Hot Air.
American Machine Co.

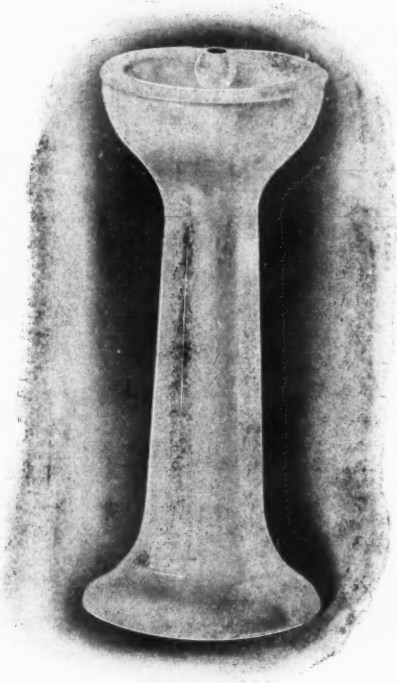
Engravings.
Krus Engraving Co.

Fans, Water, Belt and Electric.
Bates & Bro. Co., D. L.

Ferrules.
Blake Specialty Co.
Campbell Mfg. Co.
Central Brass Mfg. Co.
Compound Injector & Specialty Co.
Glauber Brass Mfg. Co.
Greenwood Mfg. Co.
Illinois Malleable Iron Co.
Imperial Co.
Kellogg-Mackay Co.
King Mfg. Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.) Estate of.
Raymond Lead Co.
Rice, Edw. J.
Smith (J. R.) & Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Filters, Water.
Champion Safety Lock Co.
Hughson Steam Specialty Co
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Scaife (Wm. B.) & Sons Co.
Wright Mfg. Co.

Kindly quote "Domestic Engineering" in writing advertisers.



It is a well-known fact that millions of bacteria infest public drinking receptacles of every description.

Those more commonly known to all of us are the ones producing tuberculosis, pneumonia, diphtheria, tonsilitis and blood poisoning.

Statistics show that these diseases increase the death rate in large proportions, millions of dollars and an immense amount of time being spent each year to perfect cures for them. In a great number of cases their origin may be traced to the common public drinking cup.

We know nothing about cures but in the cut herewith illustrated we offer a preventive. This sanitary drinking fountain is sanitary in every respect. As illustrated it is enameled all over and fitted with a porcelain enameled bubbling cup, which can be arranged for a continual or self-operative flow. This fountain can also be furnished with a N. P. brass self-closing valve with a china jet, both of which are absolutely sanitary.

The fountain is 30 inches in height and has a separate bowl 13¼ inches in diameter and 5¼ inches deep, fitted on the pedestal.

We are making other styles of drinking fountains which will be illustrated and described in the near future.

Union Sanitary Mfg. Co.

NOBLESVILLE, IND.

BRANCH OFFICES

New York City
154 Nassau Street

San Francisco, Cal.
Mills Building

Manila, P. I.
33 Plaza Goiti and 79-89 Dulumbayan

Kindly quote "Domestic Engineering" in writing advertisers.

"Domestic Engineering" Buyers' Directory—Continued

Fittings, Bath Supply & Waste.
Burlington Brass Works.
Central Brass Mfg. Co.
Detroit Sanitary Supply Co.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Monarch Brass Co.
Mueller (H.) Mfg. Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Fittings, Brass.
Barrett Mfg. Co.
Boston Brass Co.
Detroit Sanitary Supply Co.
Frost Mfg. Co.
Glauber Brass Mfg. Co.
Jarecki Mfg. Co.
Imperial Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.), Estate of.
Pittsburgh Brass Mfg. Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.
Wright Mfg. Co.

Fittings, Cleanout.
Blake Specialty Co.
Campbell Mfg. Co.
Compound Injector & Specialty Co.
Detroit Sanitary Supply Co.
Estabrook's (R.) Sons.
Kellogg-Mackay Co.

Fittings, Drainage.
Barrett Mfg. Co.
Cornell & Underhill.
Estabrook's (R.) Sons.
Illinois Malleable Iron Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Wolff (L.) Mfg. Co.

Fittings, Hot Water, Etc.
American District Steam Co.
Illinois Malleable Iron Co.

Fittings, Malleable Iron.
Detroit Brass Works.
Illinois Malleable Iron Co.

Fittings, Water Closet.
Cosgrove-Cosgrove Mfg. Co.
Frost Mfg. Co.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Trenton Potteries Co.
Van Arnam Mfg. Co.
Wolff (L.) Mfg. Co.

Flanges, Roof.
Bullard Specialty Co.

Flexible Lead Pipes and Bends.
Cosgrove-Cosgrove Mfg. Co.

Floats, Copper.
Ayling & Reichert Co.
Becker Mill Co.
Berger Bros. Co.
Boston Brass Co.
Frost Mfg. Co.
Kellogg-Mackay Co.
Monarch Brass Co.
Peerless Selling Co.
Van Arnam Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Floor and Ceiling Plates.
Beaton & Corbin Mfg. Co.
Penn Engineering Co.

Flushing Valves.
American Valve Co.
Cleveland Flush Meter Co.
Monarch Brass Co.
Republic Mfg. Co.

Foot-Rests.
Jennison Co.
U. S. Radiator Corporation.

Force-Pumps.
Perkes (Chas.), Estate of.

Fountains, Drinking.
Barrett Mfg. Co.
Buffum Tool Co.
Chicago Faucet Co.
Illinois Malleable Iron Co.
Kohler (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Furnaces.
International Heater Co.

Furnaces, Melting and Soldering.
Berger Bros. Co.
Kemp Mfg. Co.
Mueller (H.) Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Gages, Steam.
Capitol Brass Works.
Continental Radiator & Fdry. Co.
International Heater Co.
Kellogg-Mackay Co.
National Steam Specialty Co.
Penn Engineering Co.
U. S. Radiator Corporation.

Gages, Water.
Belknap Mfg. Co.
Capitol Brass Works.
Continental Radiator & Fdry. Co.
Cornell & Underhill.
Detroit Brass Works.
Detroit Lubricator Co.
Jarecki Mfg. Co.
Jenkins Bros.
Kellogg-Mackay Co.
National Steam Specialty Co.
Ohio Brass Co.
Penn. Engineering Co.
U. S. Radiator Corporation.

Garbage Burners.
Illinois Malleable Iron Co.
Kewanee Boiler Co.
Wilks (S.) Mfg. Co.

Gaskets, Asbestos, Copper, Leather or Rubber.
Auburn Leather Goods Co.
Norristown Magnesia & Asbestos Co.

Generators, Heat.
Belknap Mfg. Co.
Honeywell Heating Specialty Co.
Kellogg-Mackay Co.
Milwaukee Heat Generator Co.
Watson Specialty Co.

Hangers, Pipe.
Beaton & Corbin Mfg. Co.
Berger Bros.
Cornell & Underhill.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Penn. Engineering Co.
Street & Kent Mfg. Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

Heaters, Auxiliary, for Warm Air Furnaces.
Anderson-McCutchen Co.
Davidson Heating & Construction Co.
Kellogg-Mackay Co.
U. S. Radiator Corporation.

Heaters, Laundry.
Anderson-McCutchen Co.
Boynton Furnace Co.
Continental Radiator & Fdry. Co.
Gurney Heater Mfg. Co.
Humphrey Co.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
McCrum-Howell Co.
Pittsburg Water Heater Co.
Shirley Radiator & Fdry. Co.
U. S. Radiator Corporation.

Heaters, Range Boiler.
Anderson-McCutchen Co.
Boynton Furnace Co.
Continental Radiator & Fdry. Co.
Fleck Bros. Co.
Humphrey Co.
Kellogg-Mackay Co.
Lawson Mfg. Co.
Pittsburg Water Heater Co.
Wilks (S.) Mfg. Co.
Wolff (L.) Mfg. Co.
Wood (John) Mfg. Co.

Heaters, Tank.
Anderson-McCutchen Co.
Boynton Furnace Co.
Continental Radiator & Fdry. Co.
Gurney Heater Mfg. Co.
Humphrey Co.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Kewanee Boiler Co.
Lawson Mfg. Co.
Lord & Burnham Co.
McCrum-Howell Co.
Pittsburg Water Heater Co.
U. S. Radiator Corporation.
Wilks (S.) Mfg. Co.
Wood (John) Mfg. Co.

Heaters, Water, Automatic.
Fleck Bros. Co.
Hoffman Heater Co.
Humphrey Co.
Lawson Mfg. Co.
Pittsburg Water Heater Co.
Wood (John) Mfg. Co.

Heaters, Water, Gas.
Anderson-McCutcheon Co.
Continental Radiator & Fdry. Co.
Eureka Water Heater Co.
Fleck Bros. Co.
Humphrey Co.
Kellogg-Mackay Co.
Lawson Mfg. Co.
Pittsburg Water Heater Co.
Rapid Heater Co.
Shirley Radiator & Fdry. Co.
Wood (John) Mfg. Co.

Heating Specialties.
Anderson-McCutchen Co.
Beaton & Corbin Mfg. Co.
Belknap Mfg. Co.
Capitol Brass Works.
Consolidated Engineering Co.
Davis (Louis N.) Co.
Detroit Lubricator Co.
Foster Engineering Co.
Gurney Heater Mfg. Co.
Hughson Steam Specialty Co.
Jewell Mfg. Co.
Lavigne Mfg. Co.
Monash-Younker Co.
National Steam Specialty Co.
U. S. Radiator Corporation.

Heating Systems.
American District Steam Co.
Automatic Vacuum Pump Co.
Dunham (C. A.) Co.
Kellogg-Mackay Co.
McCrum-Howell Co.
McDonald Vacuum & Vapor Specialty Co.
Moline Vacuum Vapor Heating Co.
Monash-Younker Co.
Mouat Vapor Heating Co.
National Steam Specialty Co.
U. S. Radiator Corporation.
Vapor Heating Co.

Hopper, Sterilizing.
Badger (E. B.) & Sons Co.

Hydrants.
Illinois Malleable Iron Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Kemp (C. M.) Mfg. Co.
Kennedy Valve Mfg. Co.
Mueller (H.) Mfg. Co.
Standard Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Hydraulic Driven Pump.
McDonald Vacuum & Vapor Specialty Co.

Hydraulic Exhausting Apparatus.
McDonald Vacuum & Vapor Specialty Co.

Injectors.
Compound Injector & Specialty Co.
Rapid Heater Co.

Injectors' Compound.
Compound Injector & Specialty Co.

Instantaneous Bath Water-Heaters.
Rapid Heater Co.

Joint Holder.
Wolverine Brass Works.

Labels, Rack.
Mercantile Label Co.

Laundry Supplies.
Graham (Chas.) Chem. Pottery Works.
Iron City Sanitary Mfg. Co.
Kingston Granite Tub Works.
Standard Sanitary Mfg. Co.

Lavatories, Porcelain.
Fleck Bros. Co.
Great Western Pottery Co.
Kellogg-Mackay Co.
Peerless Selling Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Lavatories, Porcelain Enameled.
Blairsville Enameled Ware Co.
Cahill Iron Works.
Enameled Tank Co.
Fleck Bros. Co.
Iron City Sanitary Mfg. Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
McCrum-Howell Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Union Sanitary Mfg. Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Lavatories, Vitreous China.
Eljer Co.
Fleck Bros. Co.
Great Western Pottery Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Lead for Plumbers.
Raymond Lead Co.

Lead Couplings.
Allyne Brass Foundry Co.
Mueller (H.) Mfg. Co.

Legs, Laundry Tray.
Cahill Iron Works.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Kohler's (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Wolff (L.) Mfg. Co.

Legs, Sink.
Blairsville Enameled Ware Co.
Cahill Iron Works.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Kohler's (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Wolff (L.) Mfg. Co.

Lubricants.
Dixon (Jos.) Crucible Co.

Medicine Cabinets for Bathrooms.
Galard Co.
Standard Sanitary Mfg. Co.

Meters, Water.
Buffalo Meter Co.

Mixers, Shower Baths.
Imperial Brass Mfg. Co.
Kellogg-Mackay Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.

Packings.
Auburn Leather Goods Co.
Cincinnati Gasket & Packing Co.
Jenkins Bros.
Smooth-On Mfg. Co.

Paste, Pipe Joint.
Dixon (Jos.) Crucible Co.
Kellogg-Mackay Co.
Smooth-on Mfg. Co.
U. S. Radiator Corporation.
Wolverine Brass Works.

Pipe and Fittings, Cast-Iron, Soil.
Campbell Mfg. Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Simmons (John) Co.
Wolff (L. Mfg. Co.

Pipe and Fittings, Cast-Iron, Water and Gas.
Estabrook's (R.) Sons Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
McCrum-Howell Co.
Simmons (John) Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

"Standard" Kitchen Sinks

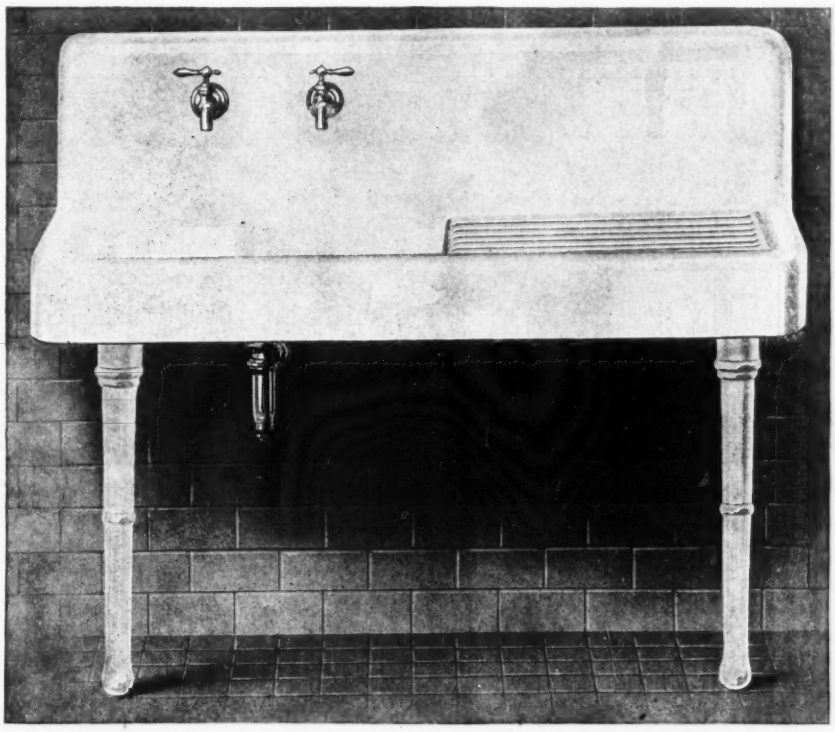


Plate P 1203¼

"Standard" Porcelain Enameled Sink Combination, with Sink, Apron, Right Hand Drain Board and Back, all in one piece, with Concealed Wall Hanger, Rubber Drain Board Mat, Enameled Adjustable Legs, Nickel-plated "Eclipse" Strainer and Coupling, Fuller Adjustable Flange Bibbs, Concealed Galvanized Air Chambers, and 1½-inch "P" Trap.

The "Standard" line of kitchen sinks is undeniably the most complete on the market, their many sizes and styles making it possible to select a "Standard" sink for any requirement.

"Standard" sinks are made all in one piece, an especially desirable feature on account of the absence of cracks and crevices to lodge dirt and dust, thus insuring a high degree of cleanliness and sanitation.

"Standard" kitchen sinks are furnished with the "Eclipse" strainer and coupling which is infinitely more cleanly than the old style strainer and can be easily removed and cleaned.

"Standard" kitchen sinks bear the "Standard" Green and Gold Label, a mark of guaranteed quality and efficiency.

We have just finished an edition of envelope size sink booklets, illustrating and describing a complete line of one piece sinks. A limited quantity of these will be sent, imprinted with the plumber's name and address, upon receipt of request.

Standard Sanitary Mfg. Co.

General Offices, Pittsburgh, Pa.

New York,	35-37 W. 31st Street
Boston,	John Hancock Building
Chicago,	415 Ashland Block
St. Louis,	100-102 North Fourth Street
Philadelphia,	1128 Walnut Street
Washington, D. C.,	200 Southern Building
Pittsburgh,	949 Penn Avenue
Cleveland,	648-652 Huron Road, S. E.
Toledo, Ohio,	311-13-15 Erie Street
Louisville,	319-323 West Main Street
Nashville,	315 Tenth Avenue, So.
Houston, Tex.,	Cor. Preston and Smith Streets
Fort Worth, Texas	Front and Jones Streets
New Orleans,	Cor. Baronne and St. Joseph Streets
San Francisco, Cal,	1303-1304 Metropolis Bank Building
Toronto, Can.,	59 Richmond Street, E.
Montreal, Can.,	215 Coristine Building
London, Eng.,	57-60 Holborn Viaduct, E. C.

"Domestic Engineering" Buyers' Directory—Continued

Pipe-Conduits for Underground Steam Pipes.
American District Steam Co.
Wyckoff (A.) & Sons Co.

Pipe-Hangers.
Illinois Malleable Iron Co.
Penn. Engineering Co

Pipe-Threading and Pipe-Cutting Machinery and All Necessary Supplies.
Armstrong Mfg. Co.
Bignall & Keeler Mfg. Co.
Borden Co.
Crown Die & Tool Co.
Curtis & Curtis Co.
Hart Mfg. Co.
Jarecki Mfg. Co.
Loew Mfg. Co.
Kemp (C. M.) Mfg. Co.
Nye Tool & Machine Works.
Saunders (D.) Sons, Inc.
Toledo Pipe-Threading Machine Co.
Trimont Mfg. Co.
Walworth Mfg. Co.

Pipe-Hooks and Straps.
Berger Bros. Co.

Pipe Straps (Galvanized).
Loew Mfg. Co.

Pumps, Force.
Deming Co.
Hartley Co. (C. J.)
Kellogg-Mackay Co.
Kewanee Water Supply Co.
Leader Iron Works.
Perkes (Chas.), Estate of
Sanitary Pump Co.
Standard Pump & Engine Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Wroks.

Pumps, Vacuum.
Automatic Vacuum Pump Co.
Deming Co.
Iroquois Engineering Co.
Jennison Co.
Kellogg-Mackay Co.
McDonald Vacuum & Vapor Specialty Co.
Monash-Younker Co.

Radiators.
Belknap Mfg. Co.
Gurney Heater Mfg. Co.
Kellogg-Mackay Co.
Kewanee Boiler Co.
McCrum-Howell Co.
Shirley Radiator & Foundry Co.
U. S. Radiator Corporation.
Williamsport Radiator Co.

Radiators, Gas-Steam.
Clow (Jas. B.) & Sons.

Radiator-Shields.
Johnson (W. H.) & Son Co.
Monash-Younker Co.

Radiator-Trucks.
Stearns (F. M.) & Co.
U. S. Radiator Corporation.

Radiator Valves.
Frankfort Brass Mfg. Co.
U. S. Radiator Corporation.

Range-Boilers.
Badger (E. B.) & Sons Co.
Fleck Bros. Co.
Gerstein Bros. & Cooper.
Hayes Mfg. Co.
Scaife (Wm. B.) & Sons Co.
Simmons (John) Co.
Wolff (L.) Mfg. Co.
Wood (John) Mfg. Co.

Range-Boilers, Copper.
Badger (E. B.) & Sons Co.
Gerstein Bros. & Cooper.
Hayes Mfg. Co.

Ranges.
Illinois Malleable Iron Co.

Regulators, Hot Water.
Belknap Mfg. Co.
Foster Engineering Co.
Honeywell Heating Specialty Co.
Mueller (H.) Mfg. Co.
Ross Valve Mfg. Co.
U. S. Radiator Corporation.

Regulators, Temperature.
Belknap Mfg. Co.
Electric Heat Regulator Co.
Honeywell Heating Specialty Co.
Illinois Malleable Iron Co.
Jewell Mfg. Co.
McDonald Vacuum & Vapor Specialty Co.

Rubber Goods, Plumbing.
Canfield (H. O.) Co.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Mechanical Rubber Co.
Monarch Brass Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Scale-Removing Compound.
Compound Injector & Specialty Co.

Seats, Water Closet.
Becker Mill Co.
Central Closet Mfg. Co.
Continental Radiator & Fdry. Co.
Eljer Co.
Findelsen & Kropf Mfg. Co.
Galard Co.
Judd-Winslow Co.
Kellogg-Mackay Co.
Milwaukee Seat & Tank Co.
Never-Split Seat Co.
Peerless Selling Co.
Plumbers' Woodwork Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Van Arnam Mfg. Co.
Wolff (L.) Mfg. Co.

Sewage Ejectors.
I. X. L. Pump Mfg. Co.

Sewer-Rods.
Mueller (H.) Mfg. Co.

Sewer-Traps, Etc.
Barrett (James) Mfg. Co.
Cudell, F. E.

Shields, Radiator.
Johnson (W. H.) & Son Co.
Kellogg- Mackay Co.
Monash-Younker Co.
Wolff (L.) Mfg. Co.

Showers.
Imperial Brass Mfg. Co.

Shower Mixers.
Imperial Brass Mfg. Co.

Sink Brackets.
Campbell Mfg. Co.

Sinks, Cast-Iron.
Blairsville Enameled Ware Co.
Cahill Iron Works.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Standard Sanitary Mfg. Co.
Union Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Sinks, Copper.
Badger (E. B.) & Sons Co.
Kellogg-Mackay Co.
Wolff (L.) Mfg. Co.

Sinks, Earthenware.
Great Western Pottery Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Sinks, German Silver.
Badger (E. B.) & Sons Co.
Wolff (L.) Mfg. Co.

Sinks, Porcelain.
Fleck Bros. Co.
Graham (Chas.) Chem. Potteries Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Sinks, Porcelain Enameled.
Blairsville Enameled Ware Co.
Cahill Iron Works.
Fleck Bros. Co.
Iron City Sanitary Mfg. Co.
Kohler (J. M.) Sons Co.
McCrum-Howell Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Union Sanitary Mfg. Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Sinks, Slate.
Wolff (L.) Mfg. Co.

Sinks, Slop.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Stocks and Dies.
Armstrong Mfg. Co.
Borden Co.
Boston Brass Co.
Curtis & Curtis Co.
Hart Mfg. Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Loew Mfg. Co.
Nye Tool & Machine Works.
Saunders' (D.) Sons, Inc.
Toledo Pipe Threading Machine Co.
U. S. Radiator Corporation.

Stops, Self-Closing.
Detroit Brass Works.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.

Stoves and Ranges.
Humphrey Co.
Weiskittel (A.) & Son Co.

Tanks and Floats.
Enameled Tank Co.

Tank Balls.
Wolverine Brass Works.

Tanks, Closet.
Central Closet Mfg. Co.
Scaife (Wm. B.) & Sons Co.

Tanks, Expansion.
Continental Radiator & Fdry. Co.
Gurney Heater Mfg. Co.
International Heater Co.
Kellogg-Mackay Co.
Lord & Burnham Co.
Penn. Engineering Co.
Scaife (Wm. B.) & Sons Co.
U. S. Radiator Corporation.
Wilks (S.) Mfg. Co.
Wolff (L.) Mfg. Co.
Wood (John) Mfg. Co.

Tanks, Hot-Water.
Consolidated Engineering Co.
Leader Iron Works.
Kewanee Boiler Co.
Scaife (Wm. B.) & Sons Co.
Wilks (S.) Mfg. Co.
Wood (John) Mfg. Co.

Tanks, Storage.
Berger Bros. Co.
Continental Radiator & Fdry. Co.
Gerstein Bros. & Cooper.
Kellogg-Mackay Co.
Kewanee Boiler Co.
Leader Iron Works.
Lord & Burnham Co.
Scaife (Wm. B.) & Sons Co.
U. S. Radiator Corporation.
Wilks (S.) Mfg. Co.
Wolff (L.) Mfg. Co.
Wood (John) Mfg. Co.

Tanks, Water Closet, Automatic Flush.
Century Sanitary Mfg. Co.
Continental Radiator & Fdry. Co.
Eljer Co.
Enameled Tank Co.
Galard Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Wolff (L.) Mfg. Co.
Wood (John) Mfg. Co.

Tanks, Water Closet, Porcelain
Continental Radiator & Fdry. Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Tanks, Water Closet, Porcelain Enameled.
Blairsville Enameled Ware Co.
Cahill Iron Works.
Continental Radiator & Fdry. Co.
Enameled Tank Co.
Iron City Sanitary Mfg. Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Tanks, Water Closet, Seat Action.
Continental Radiator & Fdry. Co.
Eljer Co.
Galard Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Peerless Selling Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Tanks, Water Closet, Vitreous China.
Becker Mill Co.
Continental Radiator & Fdry. Co.
Eljer Co.
Great Western Pottery Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Sanitary Mfg. Co.
Teahen, Jas. M.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Tanks, Wood.
Berger Bros. Co.
Continental Radiator & Fdry. Co.
Galard Co.
Peerless Selling Co.
Standard Sanitary Mfg. Co.
Van Arnam Mfg. Co.
Wolff (L.) Mfg. Co.

Tapping Machines.
Glauber Brass Mfg. Co.
Mueller (H.) Mfg. Co.

Thermostats.
Jewell Mfg. Co.
U. S. Radiator Corporation.

Thermometers.
National Steam Specialty Co.

Tool Bags.
Excelsior Bag & Mfg. Co.

Tools, Plumbers' and Steamfitters'.
Anderson (W. H.) Tool & Supply Co.
Armstrong Mfg. Co.
Borden Co.
Buffum Tool Co.
Hart Mfg. Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Nye Tool & Machine Works.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

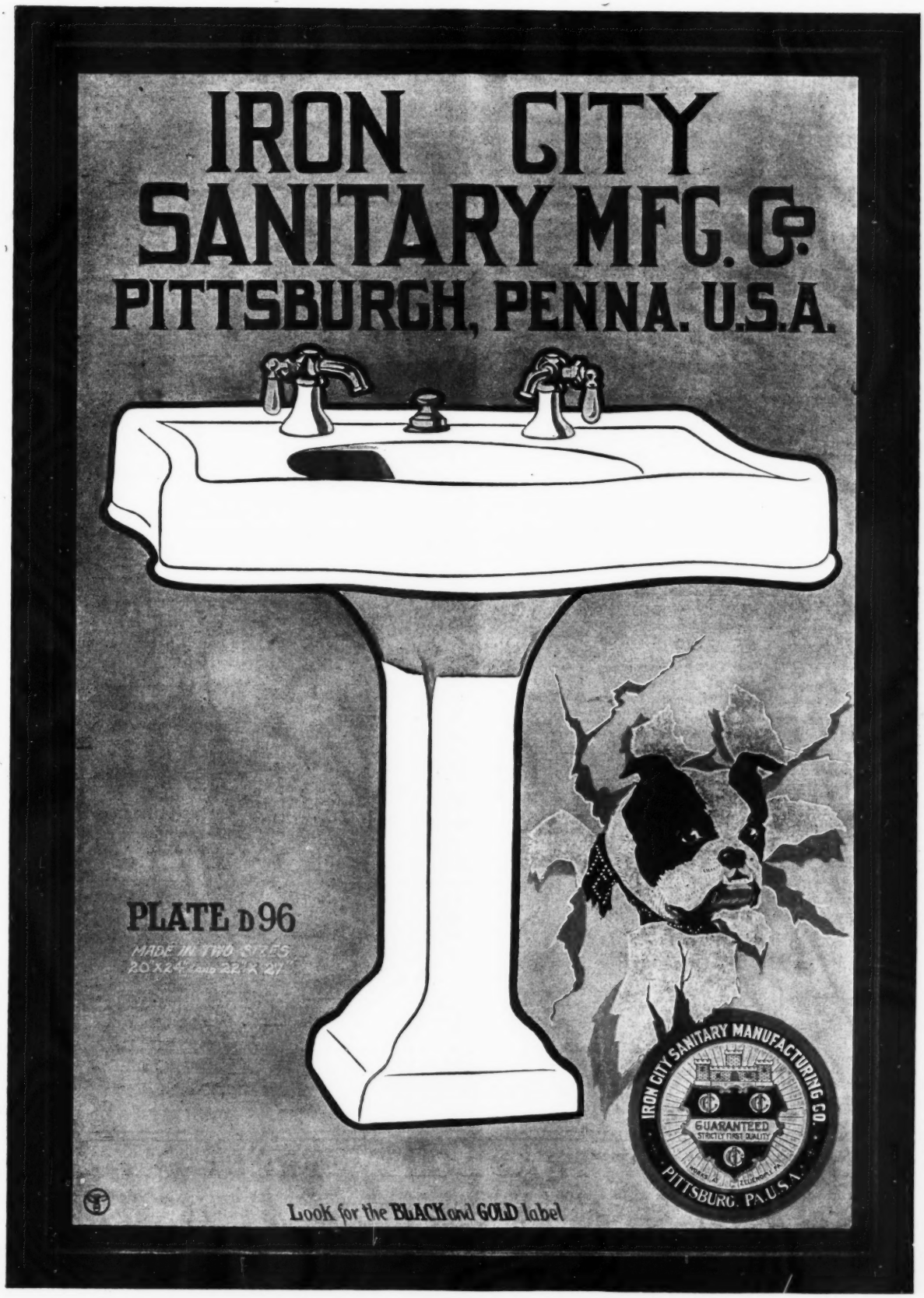
Torches, Gasoline and Kerosene.
Globe Gaslight Co.

Towel Bars.
Galard Co.
Standard Sanitary Mfg. Co.

Traps, Back Water.
Barrett Mfg. Co.
Blake Specialty Co.
Cudell, F. E.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Kennedy Valve Mfg. Co.
Monarch Brass Co.
Weiler Bros.
Wolff (L.) Mfg. Co.

Traps, Brass.
A. D. Mfg. Co.
Blake Specialty Co.
Borden Co.
Compound Injector & Specialty Co.
Detroit Sanitary Supply Co.
Frost Mfg. Co.
Kellogg-Mackay Co.
Monarch Brass Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Kindly quote "Domestic Engineering" in writing advertisers.



Kindly quote "Domestic Engineering" in writing advertisers.

"Domestic Engineering" Buyers' Directory—Continued

Traps, Catch Basins.

Compound Injector & Specialty Co.
Detroit Sanitary Supply Co.
Estabrook's (R.) Sons.
Frost Mfg. Co.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Monarch Brass Co.
Standard Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Traps, Grease.

Compound Injector & Specialty Co.
Estabrook's (R.) Sons.
Hughson Steam Specialty Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Raymond Lead Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.

Traps, Lead.

Blake Specialty Co.
Boston Brass Co.
Detroit Sanitary Supply Co.
Kellogg-Mackay Co.
Monarch Brass Co.
Raymond Lead Co.
Wolff (L.) Mfg. Co.

Traps, Radiator and Steam-Traps.

American District Steam Co.
Compound Injector & Specialty Co.
Consolidated Engineering Co.
Kellogg-Mackay Co.
Monash-Younker Co.
National Steam Specialty Co.

Traps, Return, Vapor.

McDonald Vacuum & Vapor Specialty Co.

Traps, Sink.

Blake Specialty Co.
Frost Mfg. Co.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Monarch Brass Co.
Monash-Younker Co.
Raymond Lead Co.
Standard Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Traps, Steam.

American District Steam Co.
Dunham Co., C. A.
Jenkins Bros.
Kellogg-Mackay Co.
Walworth Mfg. Co.
Wolff (L.) Mfg. Co.
Wright Mfg. Co.

Unions, Brass.

Glauber Brass Mfg. Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Perkes (Chas.), Estate of
Pittsburgh Brass Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Unions, Cast-Iron.

Jarecki Mfg. Co.
Kellogg-Mackay Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

Urinals.

Cahill Iron Works.
Eljer Co.
Great Western Pottery Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Urinals, Cast-Iron.

Cahill Iron Works.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Standard Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Urinals, Porcelain.

Great Western Pottery Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Vacuum-Cleaning Machines.

McCrum-Howell Co.

Vacuum-Heating Systems.

Automatic Vacuum Pump Co.
Consolidated Engineering Co.
Dunham Co., C. A.
Iroquois Engineering Co.
Monash-Younker Co.
Mouat Vapor Heating Co.
Ryan, E. J.
Vapor Heating Co.

Valves, Air.

Belknap Mfg. Co.
Consolidated Engineering Co.
Continental Radiator & Fdry. Co.
Gurney Heater Mfg. Co.
Jarecki Mfg. Co.
Jenkins Bros.
Kellogg-Mackay Co.
Lord & Burnham Co.
Monash-Younker Co.
National Steam Specialty Co.
Penn. Engineering Co.
Perkes (Chas.), Estate of
Wolff (L.) Mfg. Co.

Valves, Back Water.

Compound Injector & Specialty Co.

Valves, Float.

Belknap Mfg. Co.
Hughson Steam Specialty Co.
Kellogg-Mackay Co.
Monash-Younker Co.
Perkes (Chas.), Estate of
Wolff (L.) Mfg. Co.

Valves, Gate.

Capitol Brass Works.
Central Brass Mfg. Co.
Detroit Brass Works.
Detroit Lubricator Co.
Glauber Brass Mfg. Co.
Jarecki Mfg. Co.
Jenkins Bros.
Kellogg-Mackay Co.
Kennedy Valve Mfg. Co.
Ohio Brass Co.
Simmons (John) Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

Valves, Gate, Angle.

Detroit Brass Works.
Glauber Brass Mfg. Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Lord & Burnham Co.
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

Valves, Gate, Iron Body.

American District Steam Co.
Jarecki Mfg. Co.
Jenkins Bros.
Kellogg-Mackay Co.
Kennedy Valve Mfg. Co.
Lord & Burnham Co.
Simmons (John) Co.
Wolff (L.) Mfg. Co.

Valves, Globe.

Detroit Brass Works.
Ohio Brass Co.

Valves, Globe, Iron Body.

Jarecki Mfg. Co.
Jenkins Bros.
Kellogg-Mackay Co.
Kennedy Valve Mfg. Co.
Lord & Burnham Co.
Wolff (L.) Mfg. Co.

Valves, Pressure Regulating.

Consolidated Engineering Co.
Foster Engineering Co.
Hughson Steam Specialty Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Monash-Younker Co.
Mueller (H.) Mfg. Co.
Ohio Brass Co.
Ross Valve Mfg. Co.
Standard Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Valves, Radiator.

American District Steam Co.
Belknap Mfg. Co.
Capitol Brass Works.
Consolidated Engineering Co.
Continental Radiator & Fdry. Co.
Davis (Louis N.) Co.
Detroit Brass Works.
Detroit Lubricator Co.
Frankfort Brass Mfg. Co.
Gurney Heater Mfg. Co.
Honeywell Heating Specialty Co.
Jarecki Mfg. Co.
Jenkins Bros.
Kellogg-Mackay Co.
Kennedy Valve Mfg. Co.
Kinsey & Mahler Co.
Lavigne Mfg. Co.
Lord & Burnham Co.
Monash-Younker Co.
Ohio Brass Co.
Penn Engineering Co.
Perkes (Chas.), Estate of
U. S. Radiator Corporation.
Walworth Mfg. Co.
Wolff (L.) Mfg. Co.

Valves, Steam.

Belknap Mfg. Co.
Capitol Brass Works.
Detroit Brass Works.
Detroit Lubricator Co.
Glauber Brass Mfg. Co.
Gurney Heater Mfg. Co.
Jarecki Mfg. Co.
Jenkins Bros.
Kellogg-Mackay Co.
Kennedy Valve Mfg. Co.
Kinsey & Mahler Co.
Lord & Burnham Co.
Monash-Younker Co.
Ohio Brass Co.
Perkes (Chas.), Estate of
U. S. Radiator Corporation.
Wolff (L.) Mfg. Co.

Valves, Vacuum.

Consolidated Engineering Co.
Foster Engineering Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Monash-Younker Co.
Perkes (Chas.), Estate of
U. S. Radiator Corporation.
Walworth Mfg. Co.

Valves, Water-Closet, Flushing.

Becker Mill Co.
Boston Brass Co.
Frost Mfg. Co.
Haas (Philip) Co.
Kellogg-Mackay Co.
Monash-Younker Co.
Sanitary Mfg. Co.
Van Arnam Mfg. Co.
Wolff (L.) Mfg. Co.

Valves, Water-Closet, Flushometer Type.

Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Vent Caps.

Wolverine Brass Works.

Vises, Pipe.

Armstrong Mfg. Co.
Curtis & Curtis Co.
Glauber Brass Mfg. Co.
Jarecki Mfg. Co.
Nye Tool & Machine Works.
Parker (Chas.) Co.
Saunders' (D.) Sons, Inc.
Toledo Pipe Threading Machine Co.
U. S. Radiator Corporation.
Walworth Mfg. Co.

Vitreous-China Dressing Table.

Maddock's (Thos.) Sons Co.

Vitreous-China Manicuring Table.

Maddock's (Thos.) Sons Co.

Vitreous-China Sanitary Ware.

Eljer Co.
Great Western Pottery Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Trenton Potteries Co.
Wheeling Sanitary Mfg. Co.

Washers, Leather, Paper, Asbestos, or Rubber.

Auburn Leather Goods Co.

Washing Machines, Water Power.

Bates (D. L.) & Bro. Co.

Wastes and Overflows.

A. D. Mfg. Co.
Central Brass Mfg. Co.
Detroit Sanitary Supply Co.
Glauber Brass Mfg. Co.
Kellogg-Mackay Co.
Mueller (H.) Mfg. Co.
Standard Sanitary Mfg. Co.
Street & Kent Mfg. Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

Waste-Pipe Couplings.

Stewart Mfg. Co.

Water-Closets Bends.

Rice (Edw. J.) Mfg. Co.
Southern Pipe & Foundry Co.

Water-Closet Brass Specialties.

Century Sanitary Mfg. Co., Eastwood, N. Y.
Peerless Selling Co.

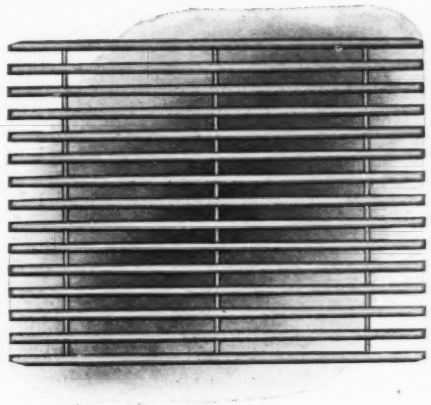
Water-Closet Combinations.

Becker Mill Co.
Central Closet Mfg. Co.
Continental Radiator & Fdry. Co.
Eljer Co.
Findeisen & Kropf Mfg. Co.
Fleck Bros. Co.
Galard Co.
Great Western Pottery Co.
Illinois Malleable Iron Co.
Kellogg-Mackay Co.
Kohler (J. M.) Sons Co.
Maddock's (Thos.) Sons Co.
Peerless Selling Co.
Perkes (Chas.), Estate of
Pfau Mfg. Co.
Pittsburg Brass Mfg. Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Van Arnam Mfg. Co.
Watrous Co.
Wheeling Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

IRON BODY TRAP SCREW FERRULES

We are furnishing some of the largest jobbers in the country—why not you? Don't forget that we guarantee to ship any order within one week.

King Manufacturing Company Goods sold to jobbers only BIRMINGHAM, ALABAMA P. O. BOX 481



OUR NEW WOOD MAT FOR TENNESSEE SINKS

For some time we have been endeavoring to secure a drain board mat which would have all the advantages and none of the disadvantages of the rubber mat. The mat shown here is the result of our investigations and experiments and it has already met with hearty approval from the trade. This mat is made of a series of round wood slats held together firmly by three smaller pieces, one at each end and one in the center, which fits through holes bored in the large slats. The entire mat is finished in white to match the sink and is exceedingly handsome and serviceable. Furnished with all "Tennessee" kitchen and pantry sinks.

OUR IMPROVED ADJUSTABLE SINK LEG FOR "TENNESSEE" AND "CHATTANOOGA" SINKS

We have discarded the old style sink leg shown with our "Tennessee" and "Chattanooga" sinks in catalog "G", and in future will furnish leg shown here. We consider this leg much superior to the former pattern and, in fact, the handsomest and most symmetrical sink leg on the market. When legs are painted, the floor flange is cast integral. When enameled, we furnish a brass nickel-plated flange which screws up into leg. This flange has two screw holes drilled in same so that leg can be securely fastened to floor.

Made in three sizes:

24-¼" adjusting to 26-¾"
27-¼" adjusting to 29-¾"
30" adjusting to 32-½"

The CAHILL IRON WORKS, Chattanooga, Tenn., U.S.A.

New York Office and Display Rooms,
1161 Broadway,
THOS. H. HUTCHINSON, Sales Agent

Portland Office and Warehouse
550 Sherlock Building
H. A. HEPPNER & CO., Sales Agents

San Francisco Office and Display Rooms
1749 Sacramento Street
CHAS. H. STANYAN, Sales Agent

Philadelphia Office
5604 N. Fourth Street
RUSSELL D. KNIGHT, Sales Agent

Havana, Cuba, Office
San Ignacio No. 50
CAGIGAS & QUESADA, Sales Agents

"Domestic Engineering" Buyers' Directory—Continued

Water-Closet Combinations, Automatic Flushing.

Abingdon Seat & Tank Co.
Central Closet Co.
Eljer Co.
Findeisen & Kropf Mfg. Co.
Haas (Philip) Co.
I. X. L. Pump & Mfg. Co.
Kellogg-Mackay Co.
Kelly (Thos.) & Bros.
Maddock's (Thos.) Sons Co.
Perkes (Chas.), Estate of.
Standard Sanitary Mfg. Co.
Trenton Potteries Co.
Van Arman Mfg. Co.

Water Closet Combination, Wall Outlet.

Federal Huber Co.

Water-Closets, Enameled.

Central Closet Co.
Continental Radiator & Fdry. Co.
Iron City Sanitary Mfg. Co.
Kellogg-Mackay Co.
Kelly (Thos.) & Bros.
Kohler (J. M.) Sons Co.
Sanitary Mfg. Co.
Standard Sanitary Mfg. Co.
Wolff (L.) Mfg. Co.

Water-Closet, Frost Proof.

Central Brass Mfg. Co.
Fleck Bros. Co.
Haas (Philip) Co.
I. X. L. Pump & Mfg. Co.
Kellogg-Mackay Co.
Maddock's (Thos.) Sons Co.
Pittsburgh Brass Mfg. Co.
Standard Sanitary Mfg. Co.
Vogel (Joseph A.) Co.
Watrous Co.
Wolff (L.) Mfg. Co.

Water-Heaters, Coal.

American District Steam Co.
Boynton Furnace Co.
Continental Radiator & Fdry. Co.
Gurney Heater Mfg. Co.
Illinois Malleable Iron Co.
International Heater Co.
Kellogg-Mackay Co.
Kemp (C. M.) Mfg. Co.
Kewanee Boiler Co.
Loew Mfg. Co.
Shirley Radiator & Foundry Co.
U. S. Radiator Corporation.
Wilks (S.) Mfg. Co.
Williamsport Radiator Co.

Water-Heaters, Gas, Automatic.

Humphrey Co.
Mustee Water Heater Co.
Pittsburg Water Heater Co.

Water-Heaters, Gas, Instantaneous.

Humphrey Co.
Mustee Water Heater Co.
Warren Heater Co.

Water-Heaters, Gas Range.

Pittsburg Water Heater Co.

Water Main Tapping Machines.

Mueller (H.) Mfg. Co.

Water, Softening.

Compound Injector & Specialty Co.

Water Supply, Domestic, Water Lifts.

Bishop & Babcock Co.
Buckeye Pump & Mfg. Co.
Illinois Pump & Brass Co.
Ross Valve Mfg. Co.
Vaile-Kimes Co.

Water Supply Systems, Pneumatic.

Fleck Bros. Co.
Flint & Walling Mfg. Co.
Kewanee Water Supply Co.
Leader Iron Works.
Scaife (Wm. B.) & Sons Co.
Standard Pump & Engine Co.

Water Supply Systems.

Dayton Pump & Mfg. Co.
Fleck Bros. Co.
Kellogg-Mackay Co.
I. X. L. Pump & Mfg. Co.
Kewanee Water Supply Co.
Leader Iron Works.
Sanitary Pump Co.
Scaife (Wm. B.) & Sons Co.
Standard Pump & Engine Co.
United Pump & Power Co.

Woodwork, Plumbers'.

Abingdon Seat & Tank Mfg. Co.
Becker Mill Co.
Findeisen & Kropf Mfg. Co.
Galard Co.
Judd-Winslow Co.
Kellogg-Mackay Co.
Never-Split Seat Co.
Pfau Mfg. Co.
Plumbers' Woodwork Co.
Sanitary Mfg. Co.
Van Arnam Mfg. Co.

Wrenches, Pipe.

Armstrong Mfg. Co.
Brock Wrench Co.
Cochran Pipe Wrench Mfg. Co.
Cornell & Underhill.
Crown Die & Tool Co.
Jarecki Mfg. Co.
Kellogg-Mackay Co.
Saunders' (D.) Sons, Inc.
Stanley Universal Wrench Co.
Trimont Mfg. Co.
U. S. Radiator Corporation.
Walworth Mfg. Co.
Williams (J. H.) & Co.
Wolff (L.) Mfg. Co.
Wolverine Brass Works.

If you—
could come to Kewanee

The Quality That Wears vs. Trouble and Repairs

—go through our shops and see how our pumping machinery is made, you would talk "Kewanee quality" to everyone who mentioned "water supply."

We can tell you in our ads and in our correspondence what pains we take to make our machinery simple, so an inexperienced man can run it, but here you could see the extra work we do to give it this value. You could see where the Kewanee quality is put into

THE KEWANEE SYSTEM OF WATER SUPPLY

When you see the Kewanee pumping machinery, you appreciate its completeness and compactness. After it has run for years, you know it is durable, but here in Kewanee we can show you the processes whereby the long life, the ease of operation, the real quality are put into it. You could tell your customers how it was done and actually show them why it was done.

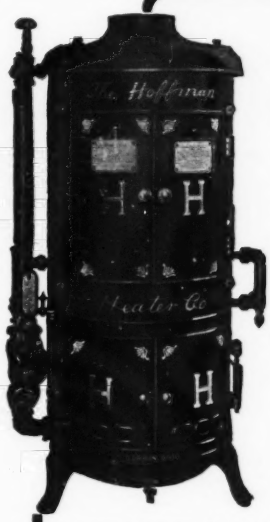
A man prominent in the trade after going through our shop said, "I had no idea you went into the matter so thoroughly and looked after the details as you do." The man actually feels the "Kewanee Quality," and he will sell Kewanee Systems while his competitors look on.

Even if you come to Kewanee, you need our new catalog, for it shows our entire line and gives in a condensed form, our experience of years in solving water problems. This information is valuable to you and if you write out nearest office, we will gladly send it.

Ask About Our Plan For Working With the Dealer.

Kewanee Water Supply Co.

2080 Hudson Terminal Bldg. 50 Church St., New York City — KEWANEE, ILLINOIS — 1212 Marquette Building Chicago



A "HOFFMAN"

Automatic Water Heater

will give the most satisfaction to you and your customers. They are the least complicated and simplest in construction of any AutomaticHeatersold.

The cut shows an exterior view of our No. 4-D Improved Hoffman Instantaneous Automatic Gas Water Heater, with a capacity of four gallons per minute.

Every Heater is sold under a positive guarantee. We also make a full line of Storage Heaters, Tank Heaters, and Thermostatic Valves.

Write for catalogue and prices

The Hoffman Heater Company

General Office and Factory:
LORAIN, OHIO

KRUS ENGRAVING CO. MILWAUKEE
SUPERIOR CUTS

Would you like everybody to know about that superior detail in your article of Manufacture which makes it better than all others?

Let our experts prepare your Photos and make your Engravings

Artists Designers
Engravers Retouchers

KRUS ENGRAVING CO.

The SUPERIOR HOUSE
MILWAUKEE WISCONSIN.

"VITRO"

NO TROUBLE

CLOSET TANKS

No Trouble?

What does it mean? It means: Install a closet—turn on the water—pick up your tools and get out.

Why? Because you do not **have** to adjust them! There is only one make of Closet that you can do this with, and that's a **VitrO.**

No linings—no fitting trouble—no after trouble. A child can operate them—lever works both ways—beautifully designed and highly finished. **You** cannot **afford** to be without them!

Remember, and **buy VITRO,** the cure for tank troubles.

Ask your jobber! **He knows!**

Manufactured by

JAMES M. TEAHEN

171-191 Beecher Ave., DETROIT, MICH.

Kindly quote "Domestic Engineering" in writing advertisers.

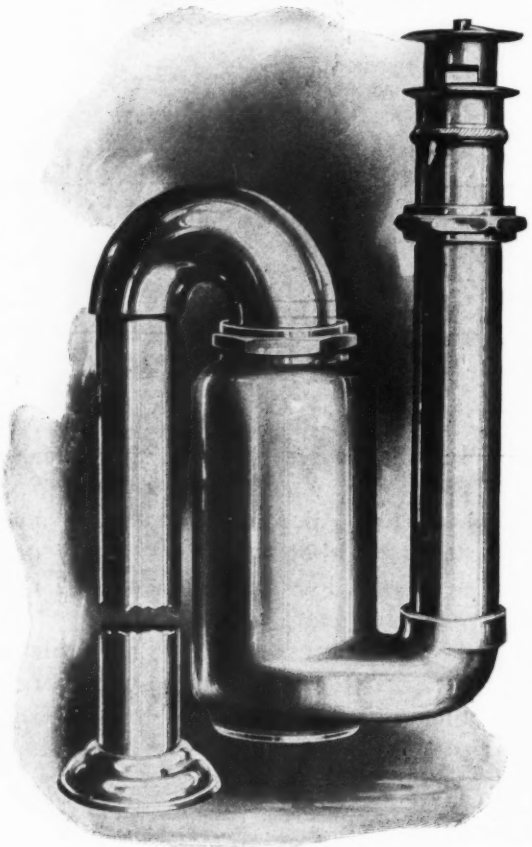
When You Do Use An Anti-Syphon

Not only because it is reasonable in price, but because it is the **most sanitary, most efficient** and **best looking fixture** of its kind on the market.

Nothing has been spared in the building of this trap to make it absolutely the peer of all ANTI-SYPHON TRAPS.

We mention as a few of its features the following:

The ***"Monarch"*** Anti-Syphon and Resealing Brass Trap for Lavatories, etc.



Patent Pending

NO INSIDE COMPARTMENTS.

NO MECHANICAL SEALING FEATURES.

NO DEFLECTORS.

HAS GROUND JOINT OUTLET AT TOP ALLOWING WIDE SWING ADJUSTMENT.

HAS CLEAN-OUT AT BOTTOM ENTIRE DIAMETER OF DRUM.

TANGENTIAL INLET MAKING IT SELF-CLEANSING.

CAST P. O. PLUG OR SINK CONNECTION and LONG INLET TUBE.

MADE IN 1¼" and 1½" SIZES P. or S. and finished or rough nickel plated.

TESTED AND APPROVED BY LEADING CITIES.

DESIGNED TO MEET THE LATEST VIEWS ON MODERN SANITATION.

A HANDSOME FIXTURE AT A REASONABLE PRICE.

Get our Booklet "D."

THE MONARCH BRASS

Trap—Use the MONARCH

Special Announcement

¶ We are pleased to inform the trade that we have now placed on the market **The Monarch Anti-Syphon Trap in Lead** which in **form, dimensions and special features** is **identical** with **The Monarch Anti-Syphon Brass Trap.**

¶ The Lead Trap is furnished **complete.** By this we mean that it requires **no piecing out** with lead pipe, either on **inlet** or **outlet.** The outlet is taken from the top, and instead of lead, is made up of a **Brass Ground Joint Elbow** rough nickel plated, into which is screwed a rough nickel plated **Brass Outlet Pipe.** This gives the lead trap the **same adjustable swinging feature** as the brass trap.

Monarch Anti-Syphon Lead Trap

¶ **The Clean-out Screw** at bottom is **brass,** and is screwed into a **brass ring** sweated into the body. No chance of bending, or marring trap in taking off clean-out. No chance of bending or marring outlet pipe inasmuch as same is made of **brass.** Inlet pipe is furnished complete to fixture.

¶ Taking into consideration the **labor-saving features** of this trap, as well as its points of merit, you will find it the **most economical and best Anti-Syphon Lead Trap on the market. Our Booklet "D,"** illustrating, listing and describing **Monarch Anti-Syphon Traps,** sent on request.

COMPANY, CLEVELAND

IT IS READY :: :: :: THE THIRD EDITION

Notes on Heating and Ventilation

By JOHN R. ALLEN, Professor Mechanical Engineering, University of Michigan

Since the second edition was exhausted and announcement of the preparation of the **Third** edition was made, the publishers have been in receipt of hundreds of inquiries about the new book.

It is ready — thoroughly revised and brought up to date; much new matter; many new illustrations.

Table of Contents

Introduction.
Theory of heat and measurement of temperature 1

Chapter I.
Heat losses from buildings and rules for determining the heat-losses in different constructions. 7

Chapter II.
Different forms of heating systems; their advantages, disadvantages and relative economy. 28

Chapter III.
The design of a direct steam-heating system and the properties of steam; steam-tables; loss of heat from radiators; rules for direct heating. 38

Chapter IV.
Design and installation of an indirect steam-heating system; rules for indirect heating.... 65

Chapter V.
Steam-boilers and steam-piping. Determination of size and details of construction..... 76

Chapter VI.
The connection of mains to risers and risers to radiators, with illustrations of different arrangements in practical use; steam-piping, piping systems, size of return-mains, valves and piping-connections. 82

Chapter VII.
The design of a hot-water heating system; radiator heat-losses, rules for direct and indirect system 120

Chapter VIII.
Hot-water boilers and piping. Determination of size and details of construction 127

Chapter IX.
Ventilation and pollution of air by human beings, artificial lighting and chemical processes; systems of ventilation 141

Chapter X.
Design of hot-air heating systems, construction and rules 152

Chapter XI.
Fan system of heating, with tables of fan capacities and condensation in heater-coil; air-mixing systems 164

Chapter XII.
A central heating system; its design and installation, with discussion of different methods of carrying pipes underground; specific apparatus; combination system of steam and hot water 187

Chapter XIII.
Pipe coverings, pipe, air-valves and fittings.....209

Chapter XIV.
Auxiliary devices for heating systems, regulation of humidity and draft; air-washers and vacuum-heating systems 218

An invaluable aid to the practical steam fitter in laying out and installing heating plants.

A complete and scientific study of heating and ventilation, both in practice and theory. The subject is covered with admirable clearness and judgment, so that this work may be regarded as a full and absolutely reliable guide in solving all heating problems.

The scope of the work includes all the accepted heating systems—steam, both direct and indirect, hot water and hot air, together with general instructions regarding ventilation and piping.

A thoroughly reliable book, which we strongly recommend.

Price, cloth bound, $2.50, delivered to you.

DOMESTIC ENGINEERING

443 SO. DEARBORN STREET - - - CHICAGO, ILLINOIS

Kindly quote "Domestic Engineering" in writing advertisers.

WOLFF PLUMBING GOODS
FIFTY-SIX YEARS OF QUALITY

HULBERT & DORSEY
Plumbing Contractors

FROST & GRANGER
Architects

GEO. A. FULLER COMPANY
Builders

The NEW NORTHWESTERN PASSENGER TERMINAL STATION, CHICAGO

Equipped throughout with Wolff Plumbing goods

MANUFACTURED BY

L. Wolff Manufacturing Co.

ESTABLISHED 1855

Manufacturers of

Plumbing Goods Exclusively

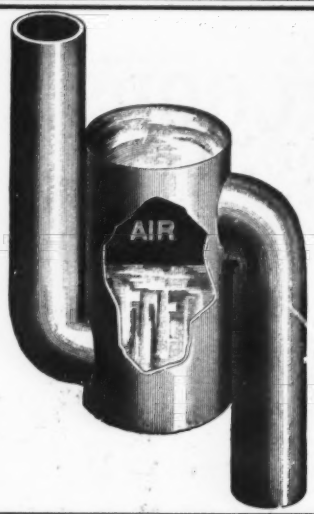
THE ONLY COMPLETE LINE MADE BY ANY ONE FIRM

General Offices: 601-627 West Lake Street, Chicago

DENVER Showrooms: 111 North Dearborn St., Chicago TRENTON

BRANCH OFFICES

MINNEAPOLIS, MINN., 515 Andrus Building
CLEVELAND, OHIO, Builders Exchange
KANSAS CITY, MO., 1205 Scarrett Building
CINCINNATI, OHIO, 506 Lyric Building
SAN FRANCISCO, CAL., Monadnock Building
OMAHA, NEB., 1116-1118 Douglas Street
WASHINGTON, D. C., 327-328 Bond Building



Say You—Anybody in Fact!

Do you know that the **CLEAN SWEEP TRAP** is the one best bet, when it comes to a Non-Syphon Sanitary Trap for good work?

Why, those new traps that are made of brass,

The elegant up-to-date designs fairly spell **QUALITY**, when on the work. And the finish of the goods!

My, my, but do get next.

Say, we have a beautiful Catalog for those who wish it. Write

Detroit Sanitary Supply Company

Sole Manufacturers

Cor. Antoinette St. and Second Ave. :: Detroit, Michigan

HOT WATER FOR DOMESTIC USE

A Complete Guide to the Methods of Supplying and Heating Water for Domestic Purposes, giving each step to be taken and explaining why it is done. This new book is now ready for delivery. 128 Pages Bound in Cloth. 50 cents postpaid.

DOMESTIC ENGINEERING, 443 SO. DEARBORN STREET, CHICAGO

P. W. CO. TANKS AND SEATS

The *"Badger"* line of tanks and seats will please your customers. We also manufacture a complete line of drain-boards, pipe-boards, bath-seats, toilet cabinets, etc.

Let us send you our new catalog.

If your jobber cannot supply you, we will tell you who can.

PLUMBERS' WOODWORK CO.

ALGOMA, WIS.

Eastern Representatives: STORY & STEPHENS 150 Nassau St., New York City

"Roughing-In House Drains"

A NEW AND INSTRUCTIVE BOOK

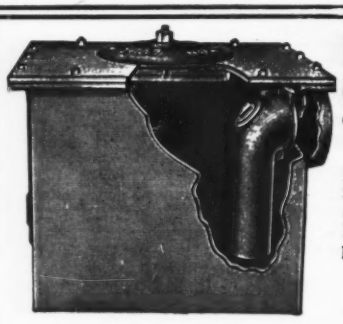
A complete Guide, from the digging of the sewer to the finishing length of the House Drain, giving each step to be taken and telling how and why it is done.

Edited by Jno. K. Allen, Member of American Society of Inspectors of Plumbing and Sanitary Engineers, Member of Royal Sanitary Institute of Great Britain, Honorary Member of Chicago Architectural Club, Associate Member American Society of Heating and Ventilating Engineers.

Book is Bound in Cloth **Price, Fifty Cents**

DOMESTIC ENGINEERING

443 So. Dearborn Street **Chicago, Ill.**



Boston Grease Trap

For Kitchen Sinks. Simple and reliable, easy to clean out. Leading plumbers prefer them.

Price $10.00

Send for Discount

R. Estabrook's Sons **1st and C Streets, Boston, Mass.**

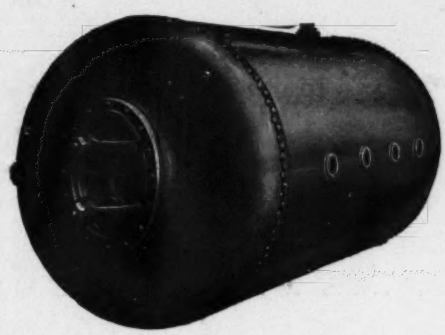
The right kind of PLUMBERS' SPECIALTIES

"Diamond Canfield" marks the products belonging to the "Line of Complete Satisfaction." To buy these **good** specialties for plumbers the best way, you need our catalog—sent free upon request.

THE H. O. CANFIELD CO.

BRIDGEPORT, CONN.

Kindly quote "Domestic Engineering" in writing advertisers.



BOILERS (LARGE — AND — SMALL)

This 300-gallon Copper Pressure Boiler was built by us for the new Boston Opera House. Shell, 3-16 inches thick; heads, ¼ inches thick; with 17 tappings. Seam brazed and hard hammered.

We solicit special boiler work. We make the best of Cistern and Riveted Pressure Boilers of all sizes and pressures. Our EAGLE Copper Range Boiler is tested to 200 pounds pressure. Guaranteed against collapse and leakage and to stand working pressure of 100 pounds.

FOR SALE BY ALL JOBBERS OF PLUMBING SUPPLIES

Gerstein Bros. & Cooper

Coppersmiths. 31 W. First St., South Boston, Mass.

Sewer and Tide Trap.

BARRETT SPECIALTIES

"Quality All Through"

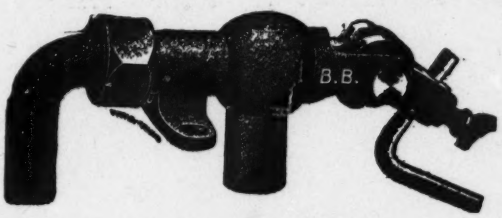
We manufacture and carry in stock a most complete line of Tidewater and Sewer Traps, O. D. Back Water Valves, Cleanouts, Grease Traps, Barrett Special Fittings, and Brass Railings in all styles.

Allow us to estimate on your requirements. The completeness of our line, our prices, and prompt shipments will please you.

JAMES BARRETT MFG. CO.

Manufacturers and Wholesale Dealers in Plumbers' Specialties

48-50 Pearl St. BOSTON 209-11 Franklin St.



YOU'RE RIGHT WHEN YOU INSIST ON

The "B. B." HIGH PRESSURE BALL COCKS

All sizes ½ inch to 3 inches inclusive for Top, Bottom or End Supply and also for Low Down Tanks with special float. Removable seat of best steam metal. We are making floats stamped with our B. B. which are thoroughly guaranteed.

BOSTON BRASS CO.,

36-40 OLIVER ST. BOSTON, MASS.

Ever Use This

For joints of gas, water, steam or air piping nothing equals Dixon's Pipe-Joint Compound. It makes tight joints but never sets.

Joseph Dixon Crucible Co., Jersey City, N. J.

Sample Can Free

If you want to test Dixon's Pipe-Joint Compound for yourself, write to us for free sample can No. 37-D—You'll like it.

Joseph Dixon Crucible Co., Jersey City, N. J.

WHAT SIZES OF PIPES SHOULD BE USED IN STEAM-HEATING PLANTS?

This is an every-day question to the steam fitter. His success largely depends upon finding the correct answer.

"SIZES OF FLOW AND RETURN STEAM MAINS"

is a complete summary of present-day theory and practice as reflected by the opinions of those best competent to judge. No steam fitter can afford to be without this book. Bound in boards—Price, postage prepaid, 50 cents.

DOMESTIC ENGINEERING, 443 So. DEARBORN STREET, CHICAGO, ILL.

We Manufacture VALVES for

The Principal Railroad Systems, Steamship Lines and Water Works.

WRITE FOR CATALOG.

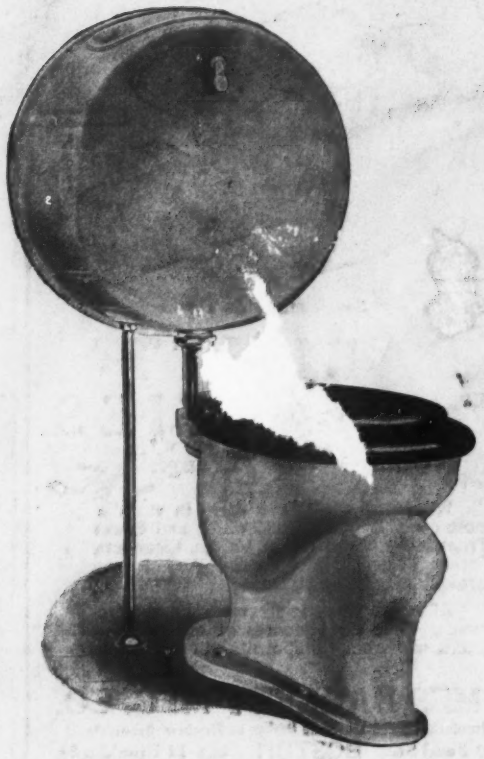
ROSS VALVE MFG. CO., Troy, New York.

REGULATING VALVES

STEAM WATER

FEED WATER FILTERS

for Land and Marine Boilers.



Eljer China Round Tank

The result of a continuous, honest effort to produce only the best.

We were the first active advocates of China Tanks and have been constantly on the alert to improve quality.

The ELJER is unquestionably in the advance and has many valuable exclusive features.

A bottom in which no mud can settle.
Supported on a Wall Hanger.
Fired harder and stronger than any other China Tank.
Extra heavy fittings throughout.

ELJER CO.
CAMERON, W. VA.